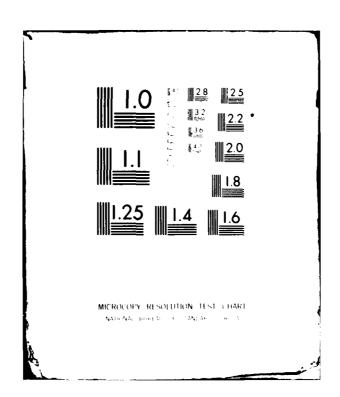
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REPORT NO. NADC-80208-60

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DESIGN, FABRICATION, AND TESTING OF THE MAXIMUM PERFORMANCE EJECTION SYSTEM (MPES) SEAT STRUCTURE

Thomas J. Zenobi and William C. Ward
Aircraft and Crew Systems Technology Directorate
NAVAL AIR DEVELOPMENT CENTER
Warminster, Pennsylvania 18974

NOVEMBER 1980

PHASE REPORT

AIRTASK NO. W0888001 Program Element No. 63216N

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Prepared for NAVAL AIR SYSTEMS COMMAND Department of the Navy Washington, D. C. 20361

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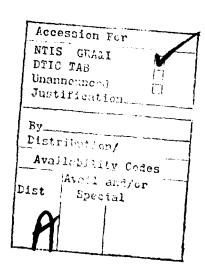
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BACKGROUND

During the past two years, the U.S. Navy, in an effort to improve aircrew safety, has undertaken an advanced development program entitled the Maximum Performance Ejection System (MPES). The system incorporates new technologies from a variety of engineering disciplines.

Currently, the MPES technology includes such subsystems as:

- Thrust vector control rocket
- Seat mounted torso restraint/parachute harness with a single point release
- Passive limb restraint
- Microprocessor controlled timing/sequencing
- Vacuum packed parachutes

The desire to incorporate thrust vector controlled propulsion requires allotment of a larger-than-standard volume under the MPES seat lid for placement of the rocket propulsion system. This condition forces the survival kit to be placed not under the seat lid, as is the standard location, but on the seat back of the seat structure. Thus, there is a unique backpack survival kit design being developed for MPES.

APPROACH

All of the forementioned technologies affect the design of the basic seat structure.

The seat structure was designed to provide flat, unobstructed surface areas for ease of component/subsystem attachment. In order to offset the anticipated increased weight of the new technology prototype seat subsystems, especially the thrust vector controlled propulsion hardware, it was necessary to construct a lightweight seat structure.

In October 1980, a competitive contract (Contract No. N66269-80-C-0203) was awarded to Stencel Aero Engineering Co. for development of a seat structure constructed of reinforced aluminum honeycomb sandwich composite material. NADC provided the contractor with a dimensionalized seat configuration. Also, NADC provided the contractor with design loads and the expected points of application of these loads on the seat structure. Appendix A of this report lists the specified design loads. Based on NADC information the contractor was able to perform a detailed structural analysis and provide a detailed design for the MPES seat structure. The structural analysis and fabrication process ${\bf r}$ is documented in Appendices B and C respectively. Photos of the manufactured seat structure are shown in Figures 1 and 2. Dimensional drawings of the structure are shown on pages 6-9 inclusive. Figure 6 shows the interface of the seat with the ejection guide rails. In order to distribute forward crash load forces over a large portion of the seat, the guide rails have been designed as a long continuous interfacing set of rails. The seat slides up the cockpit-mounted rails upon ejection. The rails are coated with a baked on molybdenum disulfide coating predicted to yield a sliding coefficient of friction of about 0.03 to 0.04.

The seat structure is designed with structural inserts at areas required

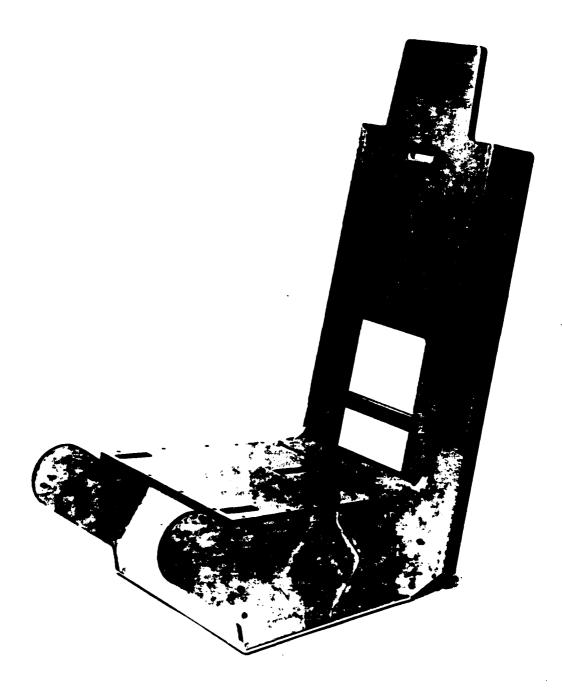


Figure 1- MPES Seat Structure

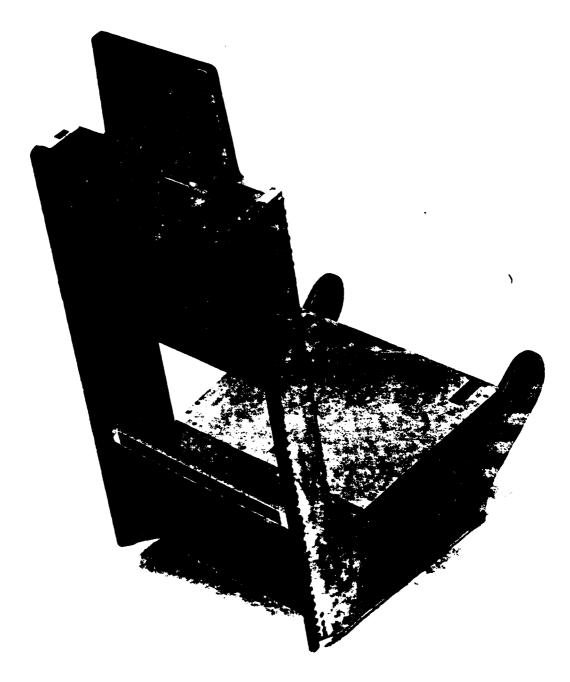


Figure 2- MPES Seat Structure (Rear View)

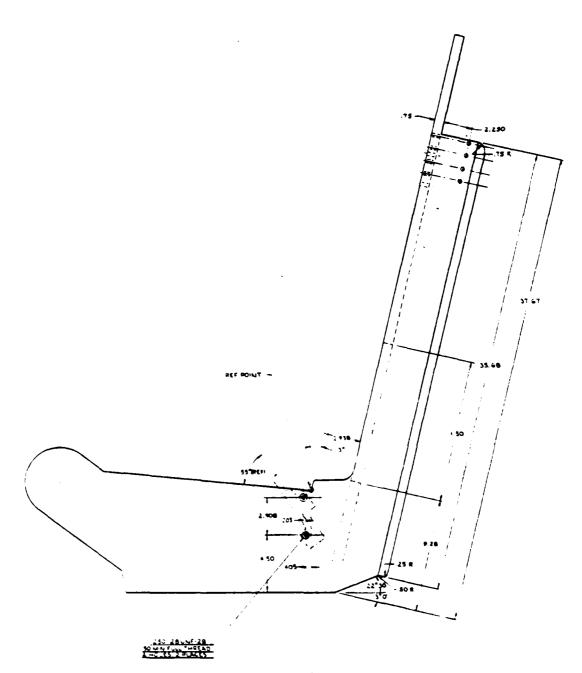


Figure 3- Dimensionalized Drawing of MPES Seat Structure (Side View)

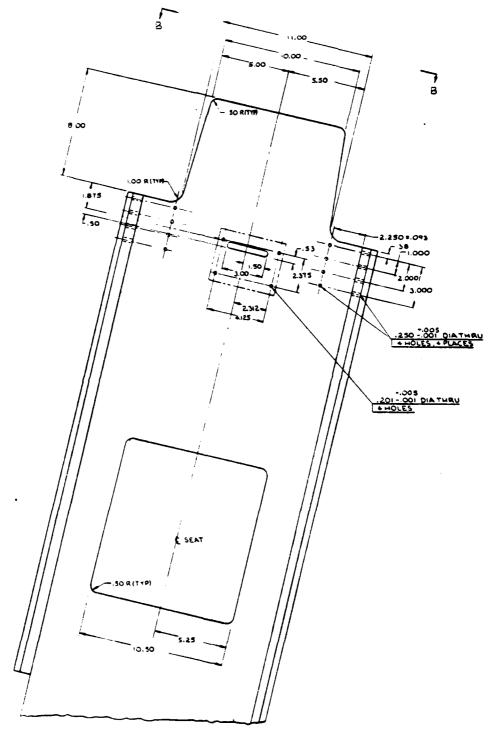
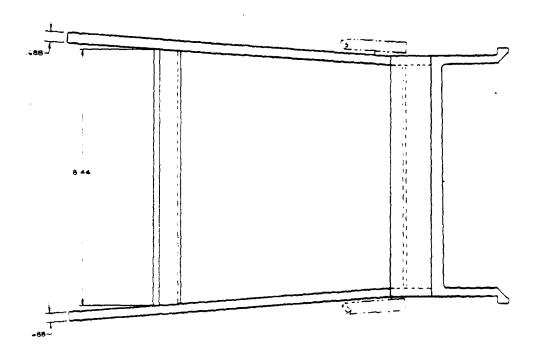


Figure 4- Dimensionalized Drawing of MPES Seat Structure (Rear View)



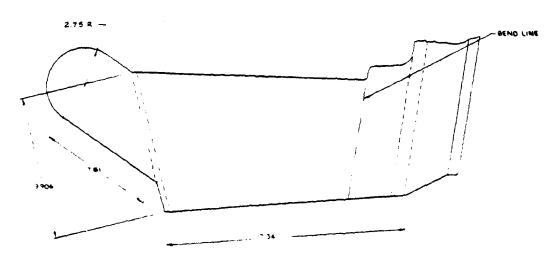


Figure 5- Dimensionalized Drawing of MPES Seat Structure (Seat Bucket)

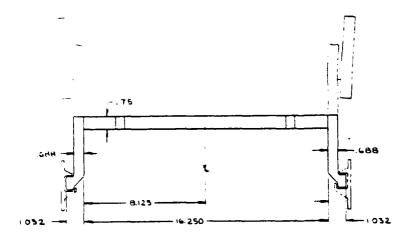


Figure 6- Dimensionalized Drawing of MPES Seat Structure (Guide Rail Interface)



Figure 7- Dimensionalized Drawing of MPES Seat Structure (Lap Belt Attachment)

to react the specified design loads. At these areas various components and fittings which must also withstand the design loads are mounted. The seat will have other components attached to it in areas where loads are minimal. In these areas the loads will be transmitted into honeycomb sandwich material. Thus, the face sheets must react these loads. The recommended method for fastening the low-load bearing components to the honeycomb sandwich construction is essentially to use methods which prevent high local compressive stresses on the honeycomb core due to fastener tightening. One method is to provide a load distribution plate on each side of the honeycomb sandwich construction as a means of distributing the local compressive stress over a larger area. Another method is to use special commercial inserts which are "potted" into the honeycomb; these inserts are essentially of tubular construction, and the compressive loads due to fastener tightening act on the insert and not on the honeycomb.

After receiving the seat structures from the contractor, NADC performed dynamic structural tests on the seats. These tests are described in Appendix D. The loads imposed on the seats during these tests were somewhat less than the design loads; however, they were severe enough to represent any loads which the seat structures may experience during the current phase of the MPES development program. Examination of the seats, after the tests, showed no evidence of material failure. Hence, the seat structures were accepted by NADC and will be used for various system and subsystem tests during the current advanced development program.

CONCLUSION

The aluminum honeycomb seat structure should provide a seat with structural integrity and low weight. However, it must be stated that the production cost, especially for low quantity production, is significantly more expensive than for seat structures composed of plate material (assuming cost is the only factor being considered). It is believed that costs can be reduced with further refinements and simplification of the overall ejection system design. Of course, the refinement and simplification of the seat structure is heavily influenced by the development of attached ejection seat subsystems and components, and by the importance placed on such factors as weight and maintainability.

APPENDTXA

MPES SEAT STRUCTURE DESIGN LOADS

INERTIA REEL LOADS (5,000 lbs.)

Loads based on 40 G forward sled tests. Approximately 2,500 lbs. tension on each inertia reel strap.

LAB BELT LOADS (6,000 lbs. on each side)

Loads based on 40 G forward sled tests.

DOWNWARD CRASH LOAD, CATAPULT ATTACHMENT FITTINGS (9,750 lbs./fitting)

Entire weight of ejection seat and most of crewman weight is supported by catapult system. Loads transmitted through catapult attachment fittings approximated to be:

 $(40g \times seat \text{ weight}) + (55g \times seight \text{ of } 98\% \text{ crewman}) \text{ or } (40 \times 170 \text{ lbs}) + (55 \times 230) = 19,450 \text{ lbs. or, for design purposes, } 19,500 \text{ lbs. (assumed to be distributed evenly on two catapult attachment fittings).}$

WINDBLAST LOADS (1,844 lbs./sq.ft.)

Based on velocity of 660 knots at sea level (compressible flow). Drag coefficient, $C_{\rm D}$, will be assumed to be approximately 1.

PARACHUTE/SEAT RELEASE FITTING LOAD (8,000 lbs. pull on seat back)

Based on estimate received from National Parachute Test Range.

HEAVY COMPONENT ATTACHMENT LOADS

Heavy components to be considered for 40 G loads include:

Parachute Package - 22 lbs. Rocket Motors - 20 lbs. Survival Kit - 8 lbs.

ROCKET THRUST VECTOR CONTROL REACTIONS WITHIN SEAT BUCKET

Seat/rocket interface structure must counteract approximately 3,500 lbs. thrust.

Thrust vector control actuators mounted on floor of seat bucket will impart shear loads (along floor) of approximately 1,000 lbs.

CREWMAN LOAD ON SEAT (12,650 lbs. distributed over seat lid)

Load for downward 40 G crash condition - 55 G dynamic response assumed, that is:

 $(55g \times weight of 98\% crewman) = 55 \times 230 = 12,600 lbs.$

APPENDIX B

MPES SEAT STRUCTURE STRUCTURAL ANALYSIS

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Introduction

This report presents final structural analysis of the MPES (Maximum Performance Ejection Seat) bucket structure. This is in response to paragraphs 3.7 and 4.0 (page 16) of Statement of Work No. 639-2662 as given in Document No. N62269-79-R-0712. (Reference 1)

Discussion

Design Description

The seat bucket structure as discussed in this report consists of two side panels, a back panel, a front panel, a rest panel, a seat panel support channel, and two guide rails. The panels are of aluminum honeycomb sandwich construction with aluminum framing and inserts. The sandwich construction consists of 7075-T6 aluminum alloy face sheets and doublers (with the exception of the front panel which has 2024-T4 aluminum alloy face sheets), and 5056 aluminum alloy hexagonal honeycomb core. The framing, inserts, support channel and guide rails are 7075-T6 aluminum alloy, with the exception of the seat panel inserts which are 7075-T73 aluminum alloy.

Design Basis and Analysis Criteria

The seat bucket was designed to withstand the loads specified in Addendum A to Statement of Work No. 639-2662 as given in Document No. N62269-79-R-0712. In addition to these specified loads a leg impact load due to windblast during high speed ejection was considered. The structure was analyzed for ultimate loads with the following criteria:

- 1- Stress in the face sheets of the honeycomb sandwich panels should not exceed yield stress.
- 2- Honeycomb shear and compressive stress should not exceed the manufacturer's minimum strength values.
- 3- Buckling of the honeycomb sandwich panels should not occur.
- 4- Tensile, compressive, shear and bearing stresses in the framing, inserts, support channel and guide rails should not exceed ultimate values.

The structure was not analyzed for limit loads, since for the materials and criteria used these would be less critical than the ultimate loads. Allowable stress values and analysis methods are documented in Reference 2.

Results of Analysis

Margins of safety (MS) against ultimate loads were obtained. The detailed analysis is presented in the Appendix. The minimum margins of safety (and all negative margins of safety) for each structural component are given in Table I. The negative margins of safety are judged to be acceptable for the following reasons:

1) Side panels - The -.05 margin of safety for core shear due to leg impact is based on a 3000 LB impact load.

Since this is an unspecified condition and the assumed magnitude of the load is Brobably

conservative, this margin of safety is judged to be acceptable. The -.01 margin of safety due to the parachute extraction line load, is probably very conservative because part of this load will be reacted by the shoulder harness straps.

- 2) Seat Panel The -.25 margin of safety for core shear due to the 40G downward crash load is based on minimum core shear strength values. Based on typical shear strength values this margin of safety is -.09. In view of the conservatism of the analysis, no design changes are planned pending test results.
- 3) Guide Rails The -.10 margin of safety for fastener shear is due to windblast at ejection tip-off.

 Because of the very brief duration of the load and the conservatism of the analysis, this margin of safety is judged to be acceptable.
- 4) Back Panel The -.04 margin of safety for bending and torsion in the upper insert arises from the parachute extraction line load. The analysis is conservative because some of this load will be reacted by the shoulder harness straps.

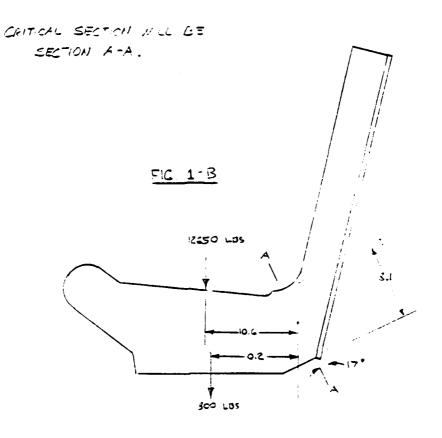
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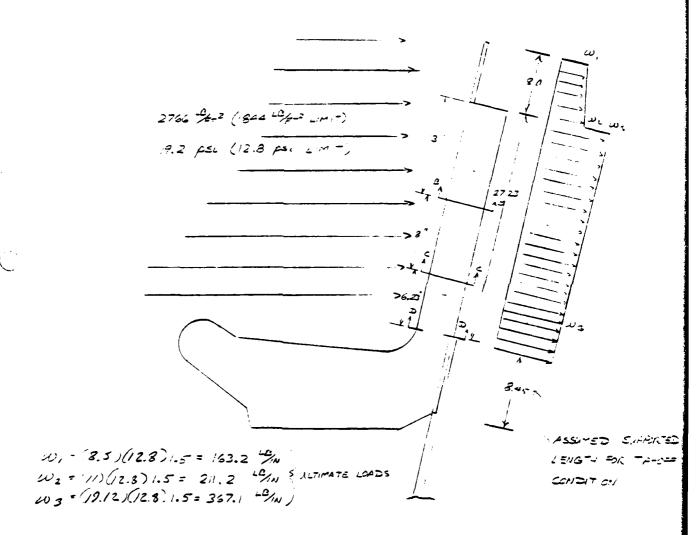
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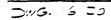
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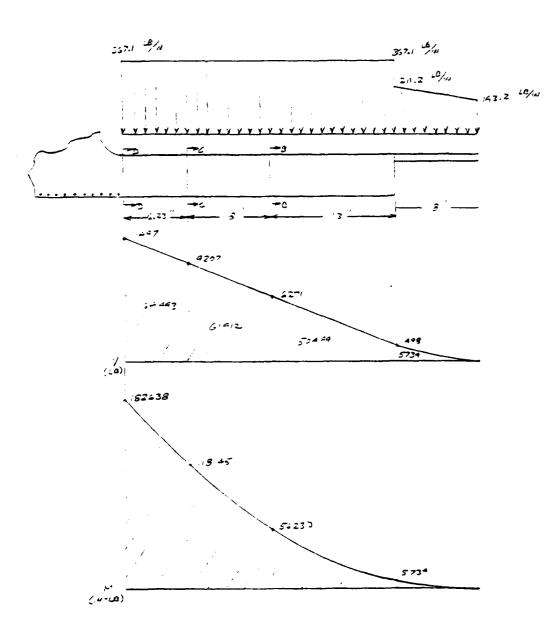
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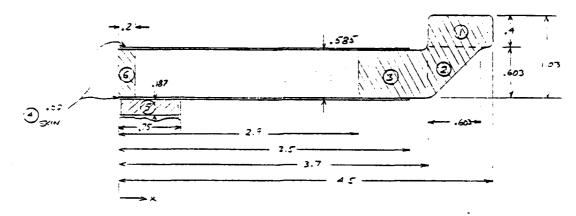


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$$Y = \frac{3.40(.827)}{.2.40(2)(.02)} = 22,400 \text{ ps}$$

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	3	.468	3.30	1,544	.0250	. 2220
	<u>@</u>	.140	1.75	.245	. 429	.1037
	3	.140	-375	.054	.0066	. 7002
	<u> </u>	243	. 210	. 052	.0036	.4 35
	5	1.50		3.9/7	. <i>a</i> ga	3,4560
	, A	I = 2	· (= / +) = 3.	65 141
	Z	1= 3500 1= 9207,	/Z = 4	1600 LB		
<i>≟≅</i> ≈⊃.∗						
		' '	/	<u>ت</u> ريخ		

$$S = \frac{1}{246(261 - .2) - .4(261 - .375) - .02(2)(2.6)^{\frac{1}{2}/2}} = .04 ...^{\frac{3}{2}}$$

$$T = \frac{4600(.04)}{3.65(2)(.02)} = 32800 ... = 1$$

$$M.s. (SHEAR) = \frac{46}{328} - 1 = 0.40$$

SECTION D-D:

SECTION PROPERTIES: SAME AS SECT, D-3 EXCEPT THAT ELEMENT @ S

ON SOLD THICK AND SECURITY @ S

ON (102+1032) THICK (1032 DOLLES ADSTO).

	ELEM, #	APEA	×	× ⁴ / ₋	T_{\star}	<i>A</i> (×-×)					
	()(%(%)	.32	4.0	1.3 2	. 5:71	330					
	3	. <i>§</i> z	3.90	.710	. 2037	. 3466					
	3	.468	3.30	: 544	.0250	. 2848					
	\odot	. 3ód	1.75	.637	. 37/6	.258					
	(b) (a)	. 140	. 375	.054	. 2064	. 544					
	<u> </u>	. 234	.20	. 247	•0031	1. 75 5 4					
	5	703		4.304	. 427/	3.54 %					
	$\overline{x} = \frac{\sum A \times}{\sum A} = \frac{A \cdot 30^{4}}{1.766} = 2.52 \text{ iv}$ $\overline{z} = \sum (\overline{z}_{\mu}' - A(x - \overline{x})^{2}) = 3.96 \text{ iv}^{4}$ $= 240s : M = 82638/2 = 91300 \text{ iv} - 16$										
_		1 = 8263 1 = 11497									
<i>ڪ</i>	wowe:	5 = M	<u> </u>	300(2.52) = 57, £	العمر دا					
	V.S.	ASA 1 57	رددء	= <u>3 8</u>	- = <u>-</u>	<u> </u>					

$$Q = .234(2.52-.26) + ./4(2.52-.375) + 2(.02-.035)(2.52)/2$$
$$= 1.17 \text{ /N}^{3}$$

$$\gamma = \frac{5750(1.17)}{3.98(.104)} = 16300 \text{ ps.}$$

MPES

SIDE PANELS (CONT) DO

DWC. 16120

CHECK SEMPING MILEG GUARDS

LEC LOAD = 3000 LBS ULF.

M= 375 (3000)=11250 ~ LISS

ML= 1250/8 = 1406 10 -05/12

3.75 30 W

TOTAL = .465

TEACE SITE = .020

TOBUE = .020

-.020

-.020

I = 0078L

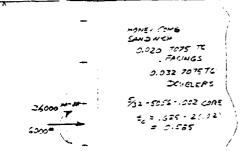
FOR 7075-TG FC7 = 67000 PSS

.12

CHECK COKE STEAK

/ = 3000/8 = 275 LES/N

F3 core 5/32 5056 - . 202 = 610 (MIN); 760 (TYP)



7075 T_{6} , $T_{6N}(MN) = 76^{-68}$ $F_{6N}(MN) = 67^{-68}$ $F_{6N}(MN) = 68^{-68}$ $F_{6N} = 46^{-68}$ $F_{6N} = 46^{-68}$ $F_{6N} = 52^{-68}$ $F_{6N}(-25) = 52^{-68}$ $F_{6N}(-25) = 100^{-68}$ $F_{6N}(-25) = 100^{-68}$



LOADS ARE FROM IZOCO (UST), FAMOUNTE EXTRACTION LINE LOAD.

FACING STRESS:
$$\frac{2(.92+.032).5^{2}}{12} = 1.87 \text{ m}^{4}$$

$$\frac{36000(3)}{5} = 57,800 \text{ psc}$$

$$\frac{3000}{5} = \frac{3000}{2(.92+.932)} = 9520 \text{ psc}$$

TOTAL COMPRESSIVE STRESS AT THE TOP - 57800 - 9620 - 67450 ps.

CHECK INTRACELL COMPRESSIVE BUCKLING: (FROM BRUINN, R.L. 5)

$$\Xi_{g} = 10.3 \times 10^{-6}$$
, $S = \frac{5}{32}$, $\Xi_{4} = 0.052$ $\Longrightarrow \frac{F_{c.}}{2} = 450,000$ as.

$$\frac{\overline{\xi}_{j}}{\overline{\xi}_{j/2}} = \frac{37}{650} \cdot 5.00 \Rightarrow \frac{\overline{\xi}_{j}}{\overline{\xi}_{j/2}} \cdot 10 \Rightarrow \overline{\xi}_{j} \cdot 10 \Rightarrow$$

CHECK COMPRESSIVE WRINKLING: (FROM BRUHN, REL. 5)

$$\frac{\overline{f_{\text{cy}}}}{(F_{\text{cw}}/h_2)} = \frac{67}{140} = 0.48 \implies \overline{f_{\text{cw}}} = 1.0 \implies \overline{f_{\text{cw}}} = 67 \text{ cm}$$

CHECK 48/LITY OF THE BOND & RESTENSES TO TRANSFER THE PROMENT WITH THE FACINGS:

SPPER FASTENER - BOLT 40AD = 6,40 LB

COND AREA $=2(.75(1.0) - 77(\frac{5}{2045})^2)^2 \cdot 1.35 \cdot 10^2$ Assume 2750 psi susar strength for the Bond

/cms, = 1,35 (2250) = 3038 #

FASTENER - LEARING MEAN ON FACINGS = $2(\frac{5}{16})(.052)$ = 0.0325

/886n = 152,000(.0325) = 4940 =

TOTAL ALLOWABLE SHEAR TRANSFER = 3038-49-0 = 7978

M.S. = 7978 -1 = 2.30

LOWER FASTENER - LOAD = 4140 #

THE BEAFING AREA WILL BE ADEQUATE IN ITSELF TO TRANSFER

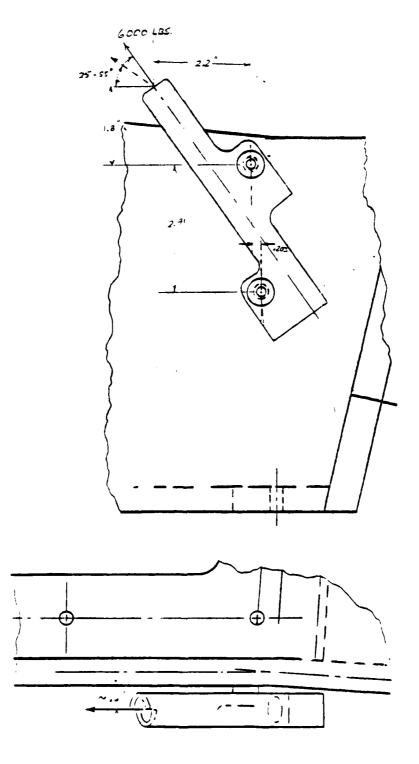
THE LOAD TO THE FACINGS.

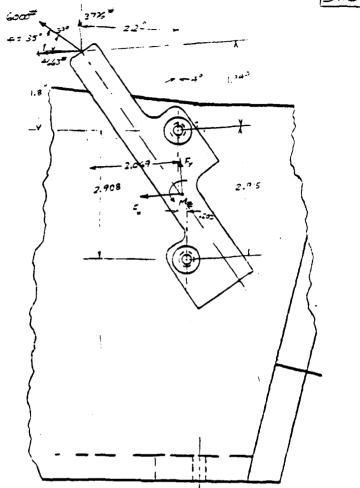
CHECK SHEAR TEARCUT OF THE UPPER FASTENCE FROM THE INSERT

// = 0,26 (46500) = 2000 =

M.S (SHEAR TEAR -OUT) = 2000 - = 0.95

SIDE PANEL - LAP BELT LOWD - 6000 LE/EDE (ULTIMATE)





FOR THE LCAD ANGLE = 35°:
$$F_c = 46G3$$
 LB

 $F_{\gamma} = 3776$ LB

 $M_{\phi} = 46G3 \left(1.949 + \frac{2.915}{2}\right) - 3776 \left(2.069\right)$
= 8072 W-LB

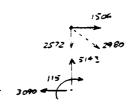
FOR THE LOAD ANGLE =
$$55^{\circ}$$
: F_{g} = 3090 LB

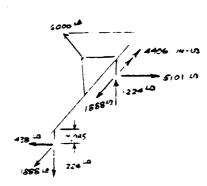
$$F_{g}$$
 = 5.43 LB

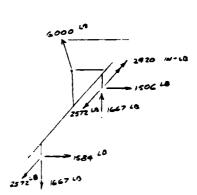
$$M_{g}$$
 = $3090\left(1040 - \frac{205}{2}\right) - 5/43\left(2.05^{2}\right)$
= $-1/5$...-18





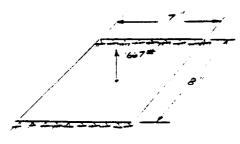






CHECK BENDING STRESS IN THE HONEY COMB SANDWICH THE TO THE NORMAL LOAD AT THE LOWER FASTENER:

TREAT AS A WIDE GEAM



EFFECTIVE WIDTH & . 65 (7) = 4.55 (FROM RCARK, 5 = ED. og. 18 (Rd. 6)

$$\sigma = \frac{M}{5(1)(A-1)} = \frac{2334}{4.85(.052)(.689-.052)} = 22121 \text{ ps.}$$

$$M.S. = \frac{68}{22.21} - 1 = \frac{2.07}{2.07}$$

CHECK CORE SHEAR:
$$\frac{2(1447/2)}{4.55(.489+.585)} = 288 \text{ psi}$$

CHECK ABILITY OF LOWER PASTENER TO CARRY THE IN FLOWE LOAD:

> ASSUME ALL OF THE LOAD IS TRANSFERRED WITH THE FACE SHEETS .

> > AL = 0.052(.81+.62) = 0.0744 m2

MONE WELD TREES

ALLOWARLE BRG. LOAD = 65000 (0.0744) = 5059 LB

· ADDESIVE 2 2 /N2

ALLOWARLE SHEAR ON THE ADMESSIE = 2 (2350) = 4500 LB

TOTAL ALLOWABLE IN-PLANE LCAD = 9559 LB

$$M.S. = \frac{9559}{300} - 1 = 2.2$$

BY INSPECTION, NO CTHER HEAS WILL BE CRITCHL

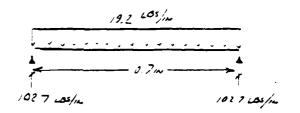
MIPES

FRONT PANEL

DWG 16160

LOAD 1844 USS/FF UMIT = 2766 LES/FT VLT = 19.2 PSIANZEA = 15.33 \times 10.7 = 196 IN

COMSIDER BENION'S ACROSS SHOULT SPALE



 $m_{MAx} = 102.7 \left(\frac{10.7}{2}\right) - \frac{1}{2}\left(192\right)^{\frac{10.7}{2}} = 275 \text{ in los}$ $\frac{275\left(\frac{.415}{2}\right)}{.0030} = 28646 \text{ PSI}$ $M = \frac{275\left(\frac{.415}{2}\right)}{.0030} = 28646 \text{ PSI}$ $M = \frac{45}{.005} = \frac{45}{.005} = \frac{45}{.005} = \frac{.57}{.005}$ $= \frac{.0030}{.005} = \frac{.0030}{.005} = \frac{.0030}{.005} = .0030 \text{ in}$

CHECK COME SHEAL

UMA: = 1027/(625-.032) = 173 MSE

FOR 3/11-5051-.001 CORE PS-2" = 200 PSI

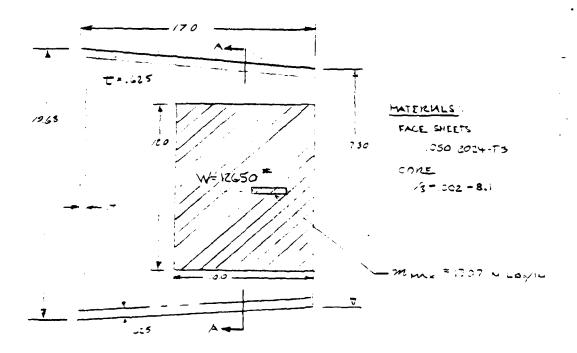
M.5 (come shear) = $\frac{200}{173} - 1$ =

15

NADC-80208-60 MPES

SEAT PANEL

DWG. 16130



SENDING INECK

JOING A 3-D COMPLETELL APPRLYS STAR MAKE THE SET BOOK MORENE IS

MMAX = 757 111 203/12

En = Mo/I = 1707 (1325/2)/[[1/(1213-1223)]

En = Mo/I = 1707 (1325/2)/[[1/(1213-1223)]

En = Mo/I = 1707 (1325/2)/[[1/(1213-1223)]

45 4 5 TOTS - TG FAIR DICERS : FILE LICETE TRE

MIS (185MONICO) = (31000) = 1 = =

MPE

STAT PANIEL CONT'D'

DNG 13/50

CHECK TORE

MATTURE /8- COL- S.1 ECSU AL.

CHECK COME CRUSHING

MAX EDGE SHEAR FROM 3-D MODEL

$$5 = \frac{557}{1(.6)} = 945 \text{ ps}.$$

3RG.
AREA

(REF. HEXCEL Mrsy) --

PROPERTIES DE JEXEE-

COMPRESSIVE STRENGTH = 1200 ps. (MW) HOLE-COMB MATERIALS , TSBICO
REVISTO 1971: REF 4)

M.5 SORE TLISTERS = 32 -1

0.27

CHILL TOUR STAR

DEC 3-0 ANALYSS - DULL = 567 LBS/14

$$\frac{25.7}{25.00} = \frac{25.7}{.025 + 50} = \frac{25.7}{.02$$

USE CORR 34EAR STREAM OF THU MSE MANN REF. -EYEE TIS II

$$MS CCORL ENDAL) = \frac{1+0}{-30} - 1 = -.25$$

ACCEPTABLE: TOWNAL

CORR SHOW STATE CONTACT ARE

700 PST CONTACT PLANNING

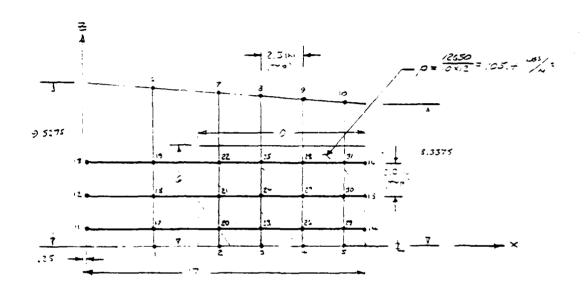
1570 NO TEST RESULTS

MPES

SEAT PAINT CONFO

DWG. 1930

SEAT PANI AND SUPPORT FLOME LOADS ARE DETAINED.
FROM THE FOLLOWING 3-D COMMUTER MODEL!



NODES ZO TYRU 31 ARE LONDED WITH 527 LES.

EACH. LODES THOM 5 ARE PRETIXANEL AGNICAT

ROTATION ONLY LODES & THAT IS ARE RESTONNED

ARAINST Y DISPLACEMENT ONLY.

MPES

SEAT PANEL (CONT'D)

DWG 15:30

ATAC THEK!

TOINT	COORDIN	JATES	DECREES	2ES	TRAIN	₹٤	1.215	. p
101141	×	2	FREEDOM	Y	θx	θᡓ	CACI	P _Y
1	4.25	0	1	0	1	1	0	•
2	8.25	0	i A	٥	1	,	1	<u> </u>
3	10.75	9	i	0)	1	' '	
4	13.25	0	:	9	1	; 1		
5	1 5 .75	0	1	0		.)		
6	4.25	9.23	•	į	0	1	NOT	
7	, 325	395)	. 0	1	LOADED	
8	10.75	8.73		1	0	! !	•	!
9	3.25	3.60		1	0	1 1		
10	15.75	3.+3	i	1		1		; ;
11	.25	1	! !	١	,	0		
12	.25	3		1	1	0	: :	\
13	.25	5		.)	1	Ó		
14	17	1		}	, l	0		
15	17	3	Y	1	1	0	.	. \
10	17	5		1	. }	ව		
7	4.25	ì	3	0	0	C	,	/
18	4.25	3	٨	7	Ā	7	7	1
19	t.25	5					0	/
20	8.25	}	1			i :	<u>i</u> t	527
21	8.25	3					ı	4
22	3.25	5					١ ١	i
23	:0.75	1	,	0 =	UNREST	RUNED	1	
2+	;0.7S	3			-		1	
25	10.75	5			:	i	. I	
26	<i>3.25</i> ،	1			i	· ' :	1	
27	:3.25	3				:	1	
25	.3 25	5	i '		•		1 .	
29	5.75						'	
30	:575	3	7	7	Ŧ	7		· ·
31	15.75	5	3	<u> </u>	၁	္	1	527

216 4 30

SEAT PAMEL (CONF'D)

INPUT DATA (CONT'D)

ELEMENT	CONNEC	TIVIT	AREA	I
COR MENT	ग्रा.।	JT.2	A KEA	
1	11	17	.2	.01658
2	17	. 20	ذ	À
. 3	20	23		
<u> </u>	23	26		
5	26	29		
6	29	14		
7	12	18		
3	.3	21		
9	21	2+		
10	24	27	. }	
11	27	30	7	•
12	30	15	.2	. 01653
13	13	19	.31851	.02640
14	19	22	. 30453	.02525
15	22	25	.29316	02431
16	25	23	-23++2	.02358
17	23	3	27553	.02186
13	3:	ا م: ا	. 26913	.0223 i
19		! -		.03316

ELEMENT	CONNE	רואורך.	AREA	I
ED ILN I	उप.।	JT.2	/ WELD -1	; -
20	17	13	٠,	.03316
21	13	19	. 4	03316
22	-9	ં ડ	. 🕶	03316
23	2	20	.3125	. CZ394
24	20	21	À	A
25	21	22 .	7	▽
26	22	7	.3.25	.02394
27	3	?3	.25	.02073
23	23	24	۵	. 4
29	24	25		
<i>3</i> 0	52	8		
31	_	24	!	1
32	24	27		
33	27	23		:
34	28	• 🤊 .		
35	5	29		: ;
36	29	30	1	
37	30	31	₹	7
38	31	10	.25	,02073

SEAT PAMEL COMP (0)

OUTPUT DATA

DISPUACIFMENT	MEMBER	LCAN

<u> </u>	MENT	·	<u>ک</u>	EMBER	LUADS		
JOINT		EL.		7012	1	TOIL	ΓΖ
	07			V	М	Α .	Σ.
: :	.307	1		-263	0	263	-1052
2	.500	2		-474	1052	47 4	-2947
3	.495	3		-137	2947	187	-34)4
+	.368	4		178	3+1+	-173	- 2968
5	-137	5		620	2943	-120	-1417
5	0	ં		:134	1417	-1134	0
7	7	7	•	-242	. 0	242	-967
3		8		- 407	967	+07	-2596
9	!	9	, ;	- i47	2596	147	- 2963
10		10	>	163	2964	-163	- 2557
11))		523	2557	- 523	-:250
1 12		12		1000	250	-1000	٥
13) 15	5	- 324	٥	324	-1295
)+			ļ	-403	1295	403	-2906
15	4	1.	5	-67	2906	67	-3075
	0	10	-	252	3075	-252	-24-5
7	302	1:	7	530	2445	-530	-1120
. 13	. 246	19	3	396	1120	- 396	2
;9	.200	19)	9	3099	Q	-3099
30	. +93	21	,	210	3 299	-210	-2678
. 21 .	32	2		3 <i>7</i> 6	2678	- 376	-1925
22	.319	2	2	755	1925	-455	. ,
23	.487	2	3	2	-250	0	- +251
24	. 424	ک ا	•	240	+251	-240	-3771
25	.311	2:	5	306	3771	-506	- 2753
26	350	25	-	<i>498</i>	2758	-693	9
27	.316	2.	,	2	3300	0	-3300
22	223	2	?	152	33C	-162	-2977
29	. 135	2:	,	379	2977	- 379	-22:9
30	- 113	2	,	537	22:9	-537	0
31	. 285] 3]	2	2473	3	-2473

MEMBER LOADS (CONTID)

EL.	Join	TI	2017	ح_
L. L.	V	1	7	М
32	85	2473	-85	-2307
33	252	2307	- 152	- 1803
بی	501	1303	- 501	5
35	0	920	2	-920
30	13	920	-13	- 393
37	63	393	-43	- 757
32	224	747	-22+	

REACTIONIS

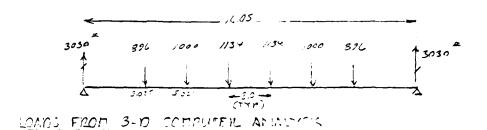
JOINT	RY
ં	455
7	<i>39</i> 8
3	537
2	501
_ ဂ	22 –
- 11	24.3
. 12	242
13	324
14	34
15	1000
16	394

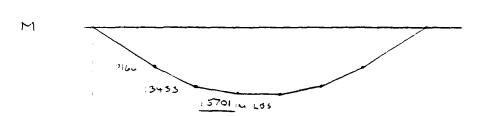
Z= 632+ x2= 14+\$ -

MFES.

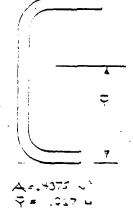
DVS 6151

SUPPORT CHANNEL

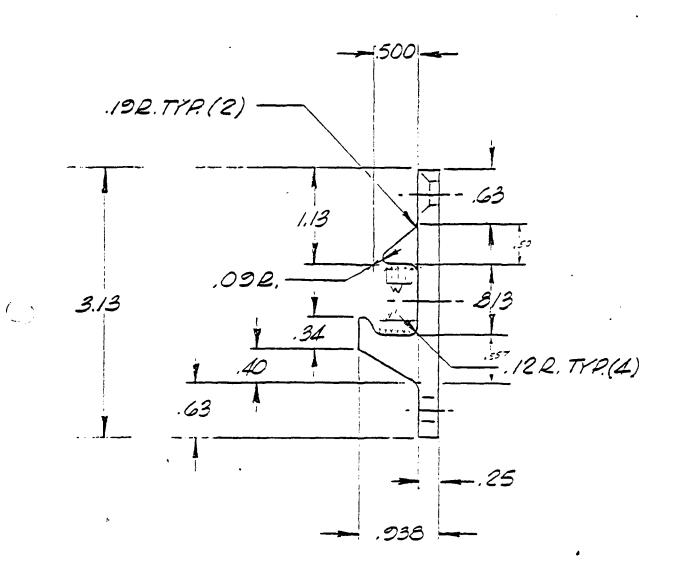




56 = Mc/I 50= 15701 (1.067) = 68101 HST FTU 7075-TG = 78000 PSS M.S (BENOWS) = 78000 -.)5



CHINE RAIL



ASSUME THE LOADS WHE REACTED & AN BLAS THOM LENGTH OF THE RM L.

231212 N-18 8.45

$$N' = \frac{2312!2(6)}{25.45} = \frac{2312!2(6)}{25$$

CHECK SHEAR STRESS: $f_s' = \frac{10395}{.557} = 8362 \text{ ps}.$ $f_s = \frac{4034}{.5} = .8063 \text{ ps}.$

Fsu = 42 700 psi

M.S. $(S-5KR) = \frac{42}{18.7} - 1 = 1.2$

ASSUME THAT THESE LOADS ARE TRANSFERRED INTO THE AMERICANT BY THE TOP & FASTEMERS.

 $J = ZA(x^2 - x^2) = 4A_{\frac{1}{2}} \left[(6)^2 - (\frac{2.5}{2})^2 - (2)^2 - (\frac{2.5}{2})^2 \right] = 172.6 \frac{2}{3}$ $Z = ZA(x^2 - x^2) = 4A_{\frac{1}{2}} \left[(6)^2 - (\frac{2.5}{2})^2 - (2)^2 - (\frac{2.5}{2})^2 \right] = 172.6 \frac{2}{3}$ $A = B A_{\frac{1}{2}}$ $A = B A_{\frac{1}{2}}$

14" & 160 ks MIN. UTS FASTENERS , FOL = 4650 LES

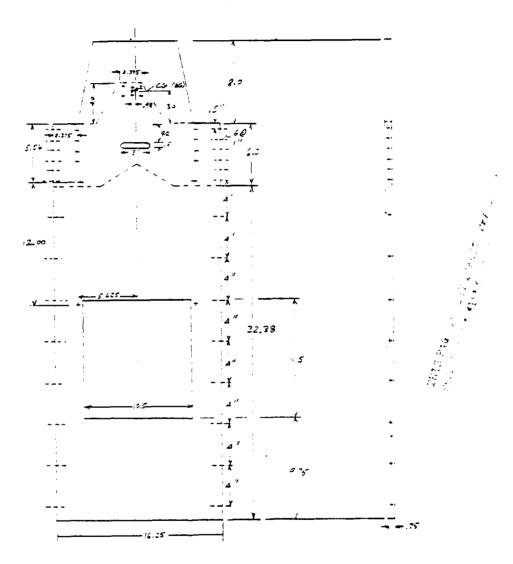
M.S. (FACTIMER CHEVE) = 4660 -1 = -0.0

THE MARGIN OF CAMETY IS THE RELEASED TO BE HOLDSTYRUS LEGAND OF THE TRANSPORT WHITE THE THE THE THE THE FACT THE FACT THE PART OF THE LEAD.

MPES BACK FAMEL

O SEDMETRY

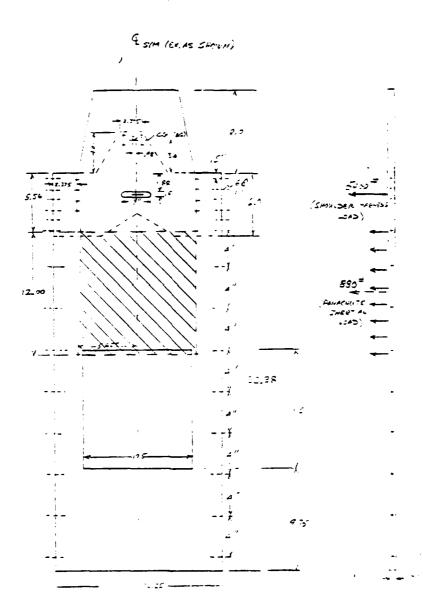
ESIM (EX. AS SUCH N)



3 20ADS

☐ 3945- JOADS

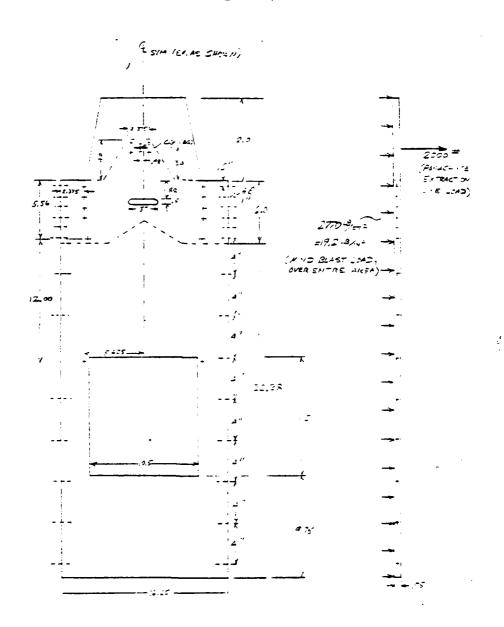
(NOTE: THESE ARE ULTIMATE LOADS)



- 40 & DOWNWARD CRASH LOADS THIS CONDITION DOES NOT DAISE AND CONTRACT LOAD IN THE BACK ANDEL.
- STECTION LOADS (NOTE: THESE ACE METHATS LOADS)

 WHO BLAST AND PARACINES LOADS IN US NOT ACT STRUCTURES OF SUIT LOADS

 THE SEAT WILL THIS SLOWED DOWN PRICK TO CASHING OF THE APPARACING.



DWS 3 0

```
3 WATERIALS FRAME-7075 T6 - FE = 77 ks LIFA
(CAR) Fey = 66 ks L
Fey = 64 ks
Fey = 64 ks
Form (36-15)=100 ks
Form (36-20)=123 ks
```

(IRPE) INSERT - TOTE TS - FILE 77 KG.

PARE FOR SELECTION SELECTIO

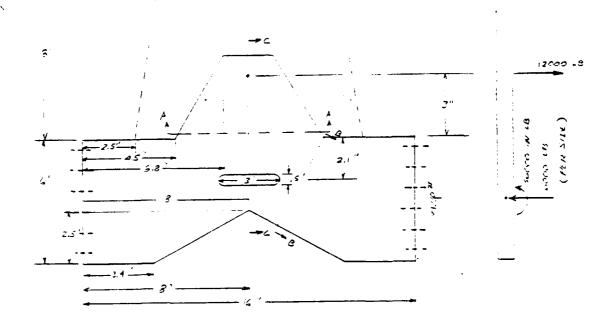
MODILUS = 24 KS

PANEL - HONEYCOME SAND WICH - FACINGS 0.020 7075 TS Fu (L) = 35 50, (-7) = 75 50 =, (4) = 50 ks , (LT) = 57 ks . F=, (4) = 68 450; (47) = 71 450 FS4 = 40 *** 304 (35=1.5)= 112 (35=2) = 52-21 FRAY (95=15 = 100 ker, (75=1,0 = 1,7 +5) - CORE /2-5053-. "01 DENSITY = 3.8 pcf COMPRESS IE STRENGT = 375 PS: (W.N. Madulus = +0 45. CRUSH STRENGTO - 235 ps. PLATE SHEAR - L DIRECT ON STRENGTH = 2 TE DSG (MW) 400 x 2 x 57 (5) - N DIRECT ON STRENGTH = 155 456 100

DETRESS ANALYSIS - BY EXAMINATION, THE STECTON LOAD CONDITION ILL

I INSERT PLATE - THE INSERT PLATE IS EXCEPTED TO A

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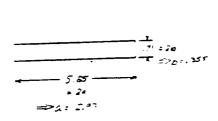
SECTION A-A:

 $\frac{V}{\sqrt{7}} (z.75 - .02(2)) \qquad A = 7(.71) = 4.97 \quad w^{2}$ $= \frac{7(.71)^{2}}{12} = 9.209 \quad w^{4}$

M= 12000/3 = 36000 U-3

PLASTIC BOG. ALLOWABLE = . 18 450

5=c= W B-3:



SECTION SHIPLES (50: $A = 5.85 (7)^{-1} - 5.5 - 9^{-1}$ $T = \frac{3.85 (7)^{2}}{2} - 0.74 - 9^{-1}$ TORSIONAL SHEAR CONSTANT (=0R ~ = \frac{7}{2}) $C = \frac{3.00^{2}}{(34+186)} = \frac{3.009^{1}}{3.(2.92+1.8(.355))}$

= 0.918 N3



PHIS ...

$$\sigma_b = \frac{2000(\frac{17}{2})}{174} = 24,500 \text{ ps}_b \implies \beta_3 = \frac{24.5}{13} = 0.21$$

$$\gamma = \frac{A400}{0.918} = 45,00 psc \implies R_s = \frac{45.1}{24} = 1.03$$

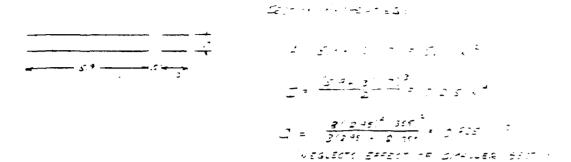
1.5. = <u>C.36</u>

5.

VADC-80208-50

DWS = 2

25:77 C-C :



$$\frac{M = 3000}{2.000} \frac{3}{10} = \frac{1000}{2.000} \frac{1}{10} = \frac{1000}{2.000} \frac{1}{10} = \frac{1000}{2.000} \frac{1}{10} = \frac{1000}{2.000} \frac{1}{10} = \frac{1000}{2.000} = \frac{1000$$

I SANDY ON PANEL - TREAT AS THOUGH IT DEGE A JOE BEAM SURPLEMENTED AT THE 6 DE FLAMES.

5x4m = A yn = y D = SEC 3N

5.2 ***

A SA**

A SA**

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(SA**)

CHECK TROMS COMPRESSIVE STREES:

M.S. 434 NS COMPRESSIVE MED) = 402 - 206

INECK CORE THEAR: $T = \frac{27}{6(47)} = \frac{2054}{(.75+.77)} = 2$ ps.

11.5. (ORE SHEAR) = 35 - 1 = -3.27

THE ABOVE SED THE MIN VALUE FOR THE WILD RESTON, SINKE THE ROSEN DIRECTOR IS SPECIFED INCE THE MIN. ALUE THE THE L'DRESTER.

LHERK INTRACEUL (THIRRES RE BUCKLING ; CERM BRIAN, BERE'

 $\frac{T_{1}}{T_{1}} = \frac{2\pi}{364} = 0.2 \implies T_{1}/T_{1} = 0 \implies T_{2} = 2\pi$ $T_{2} = 2\pi$

 $9.5. = \frac{5}{52} = \frac{33}{100} = \frac{2.0}{100}$

in a commensual of the end of the few decisions

÷ = 0 ,50 /2 0 × 56 → 5 = 30 ° €.

 $\frac{\pi_{ij}}{\pi_{ij}} = \frac{38}{60} = 1.3 \Rightarrow \frac{\pi_{ij}}{\pi_{ij}} = \frac{1.73}{1.73} \Rightarrow \pi_{ij} = 53.0$

19.00 P 20.00

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DNG 5 0

CHECK DIME OF PRESS VEI STREED CFROM HEXCEL DESIGN HODER THE 103 ,3 TO

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 $\frac{2^{\frac{1}{2}}}{\frac{\pi}{2}} = \frac{2^{\frac{1}{2}(2200)^{\frac{3}{2}}}}{\frac{\pi}{2}(\frac{1}{2}(\frac{1}{2}-1))} = \frac{2^{\frac{1}{2}(42200)^{\frac{3}{2}}}}{\frac{2\pi}{2}(\frac{1}{2}(\frac{1}{2}-1))} = \frac{95}{95} p^{\frac{1}{2}}.$

CORE CRUSHING WILL NOT BE A FIREEN

JAPER TREERS TASTENERS

$$\mathcal{E}_{SLT} = \mathcal{E}_{SROYE} = \mathcal{E}_{SPERT} = S;$$

$$\mathcal{E}_{SLT} = \mathcal{E}_{SOSO} = \mathcal{E}_{SS} = \mathcal$$

$$\frac{5}{16} \stackrel{?}{\phi} , 60 \stackrel{RS}{} \text{ M-Y, UTS} = 7555 \text{ MERS} \text{ ARE RESC.} , large = $\frac{7290}{5140} = \frac{2.19}{5140}$$$

LOWER FRAME TO SIDE PANEL TASTEMERS

THESE ARE $\frac{3}{6}$ $\frac{6}{9}$ $\frac{60}{90}$ $\frac{60}{10}$ M.S. = $\frac{3.323}{6.6}$ -1 = $\frac{3.3}{6.5}$

4	Rev.	

IV. References

- (1) Naval Air Developement Center, <u>Request for Proposal No. M62269-79-R-0712</u>, July 23, 1979.
- (2) Department of Defense, <u>Military Standardization Handbook-Metallic</u>
 <u>Materials and Elements for Aerospace Vehicle Structures</u>, <u>MIL-HDBK-5B</u>, September 1, 1971.
- (3) Hexcel Corporation, <u>Design Handbook for Honeycomb Sandwich Structures</u>, TSB 123, March, 1970.
- (4) Hexcel Corporation, <u>Mechanical Properties of Hexcel Honeycomb Materials</u>, TSB 120, 1971.
- (5) E. F. Bruhn, <u>Analysis and Design of Flight Vehicle Structures</u>, Tri-State Offset, 1973.
- (6) Raymond J. Roark and Warren C. Young, <u>Formulas for Stress and Strain</u>, McGraw-Hill, 5th Edition, 1975.

APPENDIX C

MPES SEAT STRUCTURE FABRICATION PROCEDURE

	a LATILY INDUSTRIES CAMPANY	П. 5 Сапралу	PRODUCTION ROUTE PRODUCTION ORDER NO.	ON ROL		Julis	-	O	6
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ASSEMBLY PART NO X16100

a TALLEY INDUSTRIES Company

PRODUCTION ROUTE CARD

SHEET ___ 2 __ OF __ 9__

							ASSEMBLY/PARTS LIST	
ΞM	QTY ASSV	CTY U	QTY ISS'C	DATE	PART NUMBER	REV	DESCRIPTION	REMARKS
ī	2		1	, , , , , , , , , , , , , , , , , , ,	16100-11		Fastener Tape, Hook W/adhesive	MIL-F-21840
			1				Back metal Nylon, Black 1 x 3	Type I, Cl.
2	1				16100-13		Fastener Tape, Hook W/adhesive	MIL-F-21840
							Back metal Nylon, Black	Type I Cl. I
							$1 \times 4 \cdot 1/2$	
	2				16100-15		Shim, 7075-T6 Al. Alloy	00-4-250/12
			1				.093 x 2.75 x 3.75	ļ
	1	!	 	ļ	16110-1		Back Panel Assy.	
	1	<u> </u>	 		15120-1		Side Panel Assy. L.H.	
	1_	!	 		16120-2	_ļ	Side Panel Assy, P.H.	
	<u> </u>	-	 	ļ	16130-1		Seat Panel Assy.	
3	1_	!		 	16140-11	-+	Motor Supt. Plate	
_	1	!	 		16160-1	_	Front Panel Assy.	
)	1	!	 		16171-1		Seat Cushion Assy.	
_	1	<u> </u>	 	ļ	16180-11		Closure	
2	1	 	 	 	16181-11		Supt. Channel	
3	1_	<u> </u>			16190-1		Brace Assy. Fitting L.H.	
1	1	<u> </u>	ļ		G.F.E.		Fitting C.H. Fitting, R.H.	-
	1-		 		G.F.E. AN960-C10L		Washer, Flat	
5 <u> </u>	55 34		 		AN960-C10L	+	Washer, Flat	
<u>/</u> 3	12	 		 	AN960-C516L		Washer, Flat	
<u> </u>	1 4	+		<u> </u>	FFM6010-10-C	- 		
-	1	+	 -		FFN6010-12-C	- 	Nut Plate, Floating Nut Plate, Floating	
<u>0</u> 1	25	:	† 	 	1 NAS6203-4	- i	Bolt, Hex HD	
<u>-</u>	3C	 			MAS6203-11		Bolt, Hex HD.	
<u>2</u> 3	1 2	}			NAS6204-11		Boit, Hex HD.	
4	16	┼	 		'IAS6204-17		Bolt, Hex HD.	
5	12	†		 	MAS6205-11		301t, Hex HD.	
5	17				MS20470-AD5		Rivet, Unv. FD.	
<u>5</u> 7	16	!			MS21042-4		Nut, Self, Locking	
3	14				MS24694-59	I_	Screw, Mach, Fl. HD.	
9	4				MS24694-62		Screw, Mach, Fl. HD.	
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JOB URDER NO. OPTIMATION OPTIMATION OPTIMATION OPTIMATION PA 10 Assemble L.H. Side Panel (16120-1), R.H. Side Panel (16120-2), Scat Panel Assy. (16130-1), and Front Panel Assy. (16160-1) together with #6-32 Screws (thru temporary tapped holes). Align front panel flush with top edge of both side panels and forward edge of seat panel and drill thru existing pilot holes with a #7 drill, (5) holes thru each side panel and (4) holes thru seat panel. Deburr holes as required. CAUTION: HOLE DEPTH THRU SEAT PANEL AND FRONT PANEL CAN'T EXCELD	INAME IN THE PARTY OF THE PARTY	MPES - MAKILI OFFIR	S - Seat SIR.L MANULOURS IDEN IR	8 3 3 3 10 10 10 10 10 10 10 10 10 10 10 10 10	OF SIGN OF CITEL HINSP	Sy. Of GH O
Disassemble parts and tap (14) holes in Front Panel with a #10x32 Helicoil tap. Install (14) Helicoils Inserts (MS21209F1-20) wet with primer in front panel.				4		
First piece inspection and subsequent spot check.		. ! .			P .	1 1 1 .
Assemble I.H. Side Panel, R.H. Side Panel, Front Panel, Motor Support Plate, and the Back Panel Assy. (16110-1) together by installing (temporarily), bolts into front panel and #6-32 screws thru other pane Align Back Panel and locate position of (6) holes in each side panel with (6) 5/16 inch holes in top of each side of back panel. Also, locate position of (8) .200205 holes.						
Drill thru (6) holes in each side panel that were in operation 40 with size "P" Drill (.322329), Drill thru (8) holes located in each side panel that were located in operation 40 with a #7 Drill (.200205), Deburr holes as required.					; ;	

B DRONG R 10. 14 Out R 10. 15 Out R 10. 16 Out R 10. 16 Out R 10. 17 Out R 10. 18 Out R 10. 18 Out R 10. 19 Out R 10. 10 Out R 10. 11 Out R 10. 11 Out R 10. 12 Out R 10. 13 Out R 10. 14 Out R 10. 15 Out R 10. 16 Out R 10. 17 Out R 10. 18 Out R 10. 18 Out R 10. 18 Out R 10. 19 Out R 10. 19 Out R 10. 10 Out R 10. 1	TATTA INDICEMBLE A STATE OF THE	4								
BOBDIE NO. PRODUCTION ONLINE NO. Intention Online Onli	٠			L MBLY	. ₹	1	Seat B	ucket	Assy	
Unright of the contraction Unright of the	50 2	31				SIII		1		
1 UNTR UNTRALIUMS INSTRUCTION 1 UNTRALIUMS INSTRUCTION 1 UNTRALIUMS INSTRUCTION 1 UNTRALIUMS INSTRUCTION 2 Line (8) Poles (200 - 202) in eas. side panel into each side of back panel into each side of back panel (61 deep) with a \$7 dill. 2 Line (8) Poles (200 - 202) in eas. side panel into each side of back panel with a 10x32. 2 Line (8) Poles (10) Poles in side of back panel with a 10x32. 3 Line (11) Line (12) File (10) Poles in side of back panel with grimer in back panel. 3 Line (11) File (11) File (10) File (10) Side (11) Spanel using a \$7\$ Drill (.200 - 20) and countersink top side 100 x .385 Dia. 4 Lamporarily re-assemble parts called out in operation 40. With Scat Panel secured in position line drill thru (10) loies in Seat Panel secured in position line drill thru (10) loies in Seat Panel secured in position line drill thru (10) loies in Seat Panel Panel and top (5) holes in each Side Panel with a \$10x32. 3 Line (1) Tap. 4 First piece inspection and subsequent spot check operations 90 thru		: :			Z			100	3 83	
Comporarily re-assemble parts call: at in operation 40 and drill thru (8) holes (200 - 205) in eac. side panel into each side of back panel (61 deep) with a #7 drill. 10 Disassemble and tap (16) holes in side of back panel with a 10x32 leading. 11 Install (16) helicoll inserts (MS21209F1-20) wet with primer in back panel. 12 Disassemble and tap (16) holes in seat panel with a 10x32 leading. 13 First piece inspection and subsequent spot check operations 40 thru 80 leading. 14 Employer 17 Feessemble parts colled out in operation 40. With Seat Panel secured in position line drill thru (10) holes in Seat Panel each side panel to a depth of .61 using a #7 drill. 110 Remove Seat Panel and tap (5) holes in each side Panel with a #10x32 leading. 115 First piece inspection and subsequent spot check operations 90 thru	<u> </u>	PLR	OPERALLONS INSTRUCTION	ii	5	<u>≅</u>			1837	
100 Disassemble and tap (16) holes in side of back panel with a 10x32. Helicoil Lap. Bo Install (16) helicoil Inserts (MSZ1209F1-20) wet with Erimer in back panel. Eist piece inspection and subsequent spot check uperations 40 thru 80. Brill thru (18) Filot holes in Seal Panel using a #7 Drill (.200 - 206) and countersink top side 100 x .385 Dia. Hemovarily re-assemble parts called out in operation 40. With Seat Panel secured in position line drill thru (10) holes in Seat Panel secured in position line drill thru (10) holes in Seat Panel secured in position line drill thru (10) holes in Seat Panel and tap (5) holes in each Side Panel with a #10x32 Helicoil Tap. First piece inspection and subsequent spot check operations 90 thru	PA	09	parts calle out in operation 40.205) in each side panel into each ith a #7 drill.				1			i.
1110 Remove Seat Panel and tap (5) holes in each Side Panel with a #10x32 1115 First piece inspection and subsequent spot check uperations 40 thru 80 1110 Remove Seat Panel and tap (5) holes in each Side Panel with a #10x32 1110 Remove Seat Panel and tap (5) holes in each Side Panel with a #10x32 1110 Institution and subsequent spot check operations 90 thru 1111 First piece inspection and subsequent spot check operations 90 thru	A A	<u>70</u>) holes in side of back panel with a							
First piece inspection and subsequent spot check operations 40 thru 80. Drill thru (18) Pilot holes in Seal Panel using a #7 Drill (1200 - 205) and countersink top side 1000 x 385.01a. 100 Temporarily re-assemble parts called out in operation 40. With Seat Panel secured in position line drill thru (10) holes in Saat Panel secured in position line drill thru (10) holes in Saat Panel and tap (5) holes in adeptn of 61 using a #7 drill. 110 Remove Seat Panel and tap (5) holes in each Side Panel with a #10x32 lelicoil Tap. 1115 First piece inspection and subsequent spot check operations 90 thru	P.A	. 80	(16) helicoil Inserts		· · · · · · · · · · · · · · · · · · ·		1 .	: :		NADC
90 Drill thru (18) Pilot holes in Seat Panel using a #7 Drill (.200205) and countersink top side 100 ^o x .385 Dia. 100 Temporarily re-assemble parts called out in operation 40. With Seat Panel secured in position line drill thru (10) holes in Seat Panel, (5) thru each side panel to a depth of .61 using a #7 drill. 110 Remove Seat Panel and tap (5) holes in each Side Panel with a #10x32 Helicoil Tap. 1115 First piece inspection and subsequent spot check operations 90 thru	ළ _i	85	puc						i	-60206-
Temporarily re-assemble parts called out in operation 40. With Seat Panel secured in position line drill thru (10) holes in Seat Panel, (5) thru each side panel to a depth of .61 using a #7 drill. Remove Seat Panel and tap (5) holes in each Side Panel with a #10x32 Helicoil Tap. First piece inspection and subsequent spot check operations 90 thru	PA))	thru (18) Pilot holes in Seat Panel using a #7 Drill (.200 and countersink top side $100^6 \times .385$ Dia.					· ;		: 1 : 1
Helicoil Tap. Helicoil Tap. Helicoil Tap. Hist piece inspection and subsequent spot check operations 90 thru			duit in operation 40. Will drill thru (10) holes in depth of .61 using a #7 d			:				1 : :
First piece inspection and subsequent spot check operations 90 thru	· · · · · · · · · · · · · · · · · · ·	110	ap (5) holes in each Side Panel with a							
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JOB PA PA PA	الما الأن المراج على المراج	INDESTRUITS CANYANAY PRODUCTION ORDER NO, ONTRAILOR ONTRAILOR	PAKI 110 ASSI FIBLY IIANII M #7 d.	ME TOUR MAN	X16100 X16100 MPES - Se SIII 1 I MANIIOURS IR IIIS TOTH IIIR	Seat 1 10th	Bucket Ass 5 Of Sign of	or Sign of	± ,
A A	150	Install (4) Floating Nuts (FFN6010-10-C) in Supt. Channel. Reinstall Closure and Supt. Channel and secure in place thru back holes in Seat Panel, while secured in place drill thru (2) holes (.250255) in each side panel thru supt. Channel as shown in drawing Zone B5.							50
PA 26	170	Remove Supt. Channel defour holes as required and install (4) [10ating Nuts (FFN6010-12-C) (2) each end of channel. First piece inspection and subsequent spot check operations 120 thru. 170.				111Anp 407 258	2.700		1 =

OPER TRISP (FIF 111Amego/ 25si snift MPES - Seat Bucket Assy. 5 1515 Ξ MAINIOURS 1001 01.13 ۳ ASSENBLY HANI Locate and align Motor Supt. Plate (16140-1) on bottom of side panels, Front Panel and Back Panel. Drill thru (25) existing holes in ocate Closure and secure to back panel with (11) Rivets (MS20470-A05) Permanently install front panel assy. to each side panel assy, using ocate Supt. Channel (16181-11) and secure Supt. Channel and Closure PRODUCTION ROUTE CARD Permanently install Back Panel Assy, between Side Panels using (6) Bolts (NAS6205-11) and (6) Washers (AN960-C516L) to top of each Side Panel; and (8) Bolts (NAS6203-11) and (8) Washers (AN960-C10L) Secure side panel to a depth of .61; Drill (5) holes into Front Panel to to a depth of .55. Permanently install Seat Panel Assy. in place using (14) Screws (MS24694-S56) wet with primer. to seat Panel with (4) Screws (MS24694-62) wet with primer. Screws Supt. Channel to Side Panels with (1) Bolt (NAS6204-11) and (1) Secure Closure to each side panel with (3) Rivets (MS20470-AD5) First piece inspection and subsequent spot check operations 180 Drill (8) holes into each down side of each side panel as shown in drawing Zone 5. (10) Bolts (NAS6203-11) and (10) Washers (AN960-C10L) PRODUCTION ORDER NO. depth of .55; Drill (4) holes into back panel Masher (AN960-C416L) thru each side panel. OPTENTION Motor Supt. Plate using a #7 drill. BILLIOT ALTO LIGHT FIRMS CORPORATION OFTRAFIONS INSTRUCTION wet with primer. A IMILY INDUSTRIES CARPORT wet with primer. thru 230. 380 190 220 200 210 235 240 DIFF OFER ۲. ۲, ¥. A A 8 5

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1 Unit R NO. HOUSE NO. HOU				IIVII	艺	MPES - S	- Seat Bucket Assy	ucket	Assy
MATIONS INSTRUCTION WITHATION MATIONS INSTRUCTION INTERPRETATION MATIONS INSTRUCTION MATONE MADE STATE THE ADMINISTRACTION MATONE MADE STATE (MS21209-F1-20) WET WITH Primer. MATONE MADE MADE MADE MADE MADE MADE MADE MAD	.JOB	ORDER				2.11	=	7 (6 .10
250 Remove Motor Supt. Plate and tap (25) holes drilled in operation 240 IN 1914 IN 19			OPERALION		Ξ	AHIOUR	!! :: 0		S 101
Remove Motor Supt. Plate and tap (25) holes drilled in operation 240 with a #10-32 fielical tap. 260 Install (25) Inserts (MS21209-Fi-20) wet with Primer. 265 First place inspection and subsequent spot check operations 240 thru 266 Lost Charles and Subsequent spot check operations 240 thru 267 Install Motor Supt. Plate using (25) Bolts (MAS6203-4) and (25). Mashers (AM960-C10L) as shown in drawing Zone B3 using 270 Install Brace Assv. (16190-1) as shown in drawing Zone B3 using 270 Vosition GFE Fittings at top of Back Panel and Side panels as shown in drawing Zone 03. Measure distance from fitting surface to fitting surface and make Shims (16100-15) as shown in drawing Zone C5 to achieve a distance of 16.00 Inches from surface to surface 270 Mashers (AMS6203-11) and (4) Hushers (AM960-10L). 270 Mashers (AMS6203-11) and (4) Hushers (AM960-10L). 270 Mashers (AMS6203-11) and (4) Hushers (AM960-10L). 270 Mashers (MS6203-11) and (4) Hushers (AM960-10L). 271 Mashers (MS6203-11) and (4) Hushers (AM960-10L). 272 Mashers (AM960-C10L) as shown in drawing surface to surface and distance and distance of 16.00 Inches from surface to surface and drill Seat serial number to be shipped with seats. 273 Mashers (AM960-C10L) as the drill (8) holes thing (4) thru side panel and (4) thru Back Panel using 1/4 inch drill. Deburr holes as rquired.		≃ ::		1	:5	- E		OPER INSP	INSP III
First plece inspection and subsequent spot check operations 240 260. Install Motor Supt. Plate using (25) Bolts (NASS203-4) and (25) Washers (ANS60-C10L) as shown in drawing Zone A6. [18	٧.	250	te and tap.	!			<u> </u>	į	
First piece inspection and subsequent spot check operations 240 260. Install Motor Supt. Plate using (25) Bolts (NAS6203-4) and (25) Washers (AN960-C10L) as shown in drawing Zone A6. [4] Bolts (ANS6203-11) and (4) Washers (AN960-10L). Position GFE Fittings at top of Back Panel and Side panels as shown in drawing Zone B3. Measure distance from fitting surface to fitting surface and make Shims (16100-15) as shown in drawing Zone C5 to achieve a distance of 16.00 inches from surface to surface. [4] Gentify Shims with Seat serial number to be shipped with seats. [5] Relocate GFE Fittings and Shims on 1st Seat and Seat to be shipp China Lake and drill (8) holes thru Fitting, (4) thru side panel thru Back Panel using 1/4 inch drill. Deburr holes as rquired.	A d	, <u>260</u>			1 1				
Install Motor Supt. Plate using (25) Bolts (NAS6203-4) and (25) Washers (AN960-C10L) as shown in drawing Zone A6. [Install Brace Assy. (16190-1) as shown in drawing Zone B3 using (4) Bolts (NAS6203-11) and (4) Washers (AN960-10L). Position GFE Fittings at top of Back Panel and side panels as shown in drawing Zone C5 to achieve a distance of 16:00 inches from surface to surface [Gentify Shims with Seat serial number to be shipped with seats.] [Relocate GFE Fittings and Shims on 1st Seat and Seat to be shipp China Lake and drill (8) holes thru fitting, (4) thru side panel thru Back Panel using 1/4 inch drill. Deburr holes as rquired.	ည့	\$ <u>9</u> 2	t piece inspection			•			ŀ
Install Brace Assy. (16190-1) as shown in drawing Zone B3 using (4) Bolts (NAS6203-11) and (4) Mashers (AN960-10L). Position GFE Fittings at top of Back Panel and side panels as shown in drawing Zone D3. Measure distance from fitting surface to fitting surface and make Shims (16100-15) as shown in drawing Zone C5 to achieve a distance of 16.00 inches from surface to surface. Identify Shims with Seat serial number to be shipped with seats. Relocate GFE Fittings and Shims on 1st Seat and Seat to be shipp China Lake and drill (8) holes thru fitting, (4) thru side panel thru Back Panel using 1/4 inch drill. Deburr holes as rquired.	V :	270	Motor Supt. Plate using (25) (AN960-C10L) as shown in draw				·····		
Position GFE Fittings at top of Back Panel and side panels as shown in drawing Zone D3. Measure distance from fitting surface to fitting surface and make Shims (16100-15) as shown in drawing Zone C5 to achieve a distance of 16.00 inches from surface to surface. 300 Identify Shims with Seat serial number to be shipped with seats. Relocate GFE Fittings and Shims on 1st Seat and Seat to be shipp China Lake and drill (8) holes thru Fitting, (4) thru side panel thru Back Panel using 1/4 inch drill. Deburr holes as rquired.	. W	280	(16190-1) 11) and (4					·	! '
300 Identify Shims with Seat serial number to be shipped with seats. 310 Relocate GFE Fittings and Shims on 1st Seat and Seat to be shipp China Lake and drill (8) holes thru Fitting, (4) thru side panel thru Back Panel using 1/4 inch drill. Deburr holes as rquired.	¥.	290	JFE Fittings at top of Back Panel and side pane drawing Zone D3. Measure distance from fitting surface and make Shims (16100-15) as shown in to achieve a distance of 16.00 inches from surface.				· · · · · · · · · · · · · · · · · · ·		
Relocate GFE Fittings and Shims on 1st Seat and Seat to be shipp China Lake and drill (8) holes thru Fitting, (4) thru side panel thru Back Panel using 1/4 inch drill. Deburr holes as rquired.	Ą.	300							1
	4	310	and Shims on 1st Seat and Seat to be shipp (8) holes thru Fitting, (4) thru side panel 1/4 inch drill. Deburr holes as rquired.	. ,	·				

JOB ORDE DI FI UPLR QC 3150 PA 320 PA 320 PA 320 PA 340 PA 350 PC 355	JOB ORDER NO. OPTINALIUM Secure OFF Fittings on sturcture guing to Ching Lake with Shims (16100-15), [16) Bolts (NAS6204-17) and (121) Mashers (ANS60-C416L) PA 330 Bond (2) Mook Fasteners (16100-11) and (1) Mook Fastener (16100-13) to Seat Panel Assy, as shown in drawing Zone C7 Locate from Seat Cushion (16171-1) with Cushion flush with front edge of seat panel. PA 340 Paint exposed Surfaces of guide rails with code 6 per SAEC STD. Illerssip 9-004. Locate Seat cushion (16171-1) on seat panel assy. OC 355 First plece inspection and subsequent spot check operations 320 thru 350. Serialize and identify seat bucket assy, per SAEC STD, 1119PP947-005, Class 20.		SHI LINGUINS IN TOTAL		OPER INSP	NADC-80208-60
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ASSEMBLY PART NO

16110-1

PRODUCTION ROUTE CARD

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JOB CRDER NO. PROTESTION ORDER NO. _ ASSEMBLY/PARTS LIST

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3 1	1	<u> </u>	(22, 0	3	MS24694-52		Screw	
3 4	4 AR				7-393-1		Adhesive	
5	AR				R-393-1 R-370-B		Adhesive	
5	AR		 		R-371		Edge Filler (with Catalyst)	
7					R-500		Primer	
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		A LAILLY INDUCTION PRODUCTION HOUTE CARD ASS	ASSLMBLY HAME	Back 1	Panel Assy.	Assy.	- MPES	S	
300	JOB ORDER NO.	PRODUCTION ORDER NO.			SIILLT	17	3 0	OF 7	!
		OPERALION		Æ	1011	150	<u> </u>	10 1015	
=======================================	100 8 E E	OPTRALIOUS INSTRUCTION	:	01 OF THE	<u>≅</u>	insp loth	OPER INSP	Insn-	1114
PA	2	With skin (-13) in place, locate and fit frame rembers (-19, -20, & -23) and Plate (-21) Steel stamp identify members for future assy. With transfer punch, mark, location of attach holes on -19, -20, & -23) from Bonding fixture. Drill and tap #6 - 32 x 1/4 two places on each frame member (-19, -20 & -23).							
		(NOTE: TAPPED HOLES ARE FOR LEMPORARY USE IN FIXTURE AND ARE IN PROPER LOCATION. THESE HOLES WILL LATER BE OBLITERATED BY HELICOIL TAP - SEE NOTE, Pg. 1.)							1 1 1
ЬА	20	fit and identify skins (-11 & -13) with steel stamp in inconspicuous location.						1 1	
≤ C-12	ŝż	Verify cleaning solutions concentrations and temperatures.							
PA	. 0.0	(lean parts in the following manner: All parts except Core pieces- 1. Degrease with Kimwipes saturated with MFK. 2. Clean with Oakite cleaner at STD. concentration and 140°F. to					· · · · · · · · · · · · · · · · · · ·		
		3. Rinse in cold flowing water for 3 minutes. 4. Check for water break free film. If water break occurs, repeat. #2 & #3. 5. Immerse for 10 - 11 minutes in 140°F. to 160°F. solution of Sulphuric Acid (32.3 - 40.0 og. wt.)						 	
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PRODUCTION ROUTE

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NADC-80208-60 OPER HISP TIME 1111A00907-248 CHET SIGN OFF Back Panel Assy. - MPES 5 11011 IISP SHEET MAIIIOURS 10th | IIR OPER ≅ CARD ASSEMBLY -27 Insert and place -27 into position in Core. Apply film adhesive (R-353-1) to -11 skin, trim excess and place on top of already assembled parts. Place top Assemble (4) HeliCoils (MS21209-F1-20)to tapped holes in tabs on vacant holes on tabs of -21 Plate and with (2) #6-32 x 3/8 Screws in each Apply film adhesive (R-393-1) to -13 skin. Screws. Cut R-370-B film adhesive into strips approx, 3/4" wide. Place strips on inner edge of -19, -20 & -23 Frames. Place strips on Upper and Lower edges of -21 Plate. Place -15 & -17 Core pieces in position. Wrap each -25 Insert with a strip of R-370-B, assemble onto dowel pin Place .032 shims in upper and lower, position Clean bonding fixture with Kinwipe saturated with MEK. When dry, apply ij Place above assy, into fixture, Secure with (2) #10-32 x 3/4 Screw in (on primed side) and trim off excess. Assemble -13 skin into bonding (1) Screw (MS24694-52) -21 PLATE AGAINST DRAWING Assemble -23 Bottom Frame to fixture and secure with (2) #6-32x3/4" in fixture and into core. Place strip of R-37C-B on (3) sides of Prepare test coupon and place in central cavity of Back Panel. Allow to reach room PRODUCTION ORDER NO. Assemble -19 & -20 Frames to -21 Plate using each top hole. (NOTE: CHECK POSITION OF -21 Remove both film adhesives from freezer. OPT. RATION (Assemble wet with primer.) temperature before unrolling. frame member (-19 & -20). - on mold release. each top hole. (NOTE: IT IS NON-SYMENTRICAL. UPLEATIONS INSTRUCTION Verify Above on each side -21 plate. fixture. Spray OB ORDER NO. FPT OPER 100 20 55 9 8 9 -14 4 C.

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PRODUCTION ROUTE CARD ASSIMBLY

Back Panel Assy. - MPES

NADC-80208-60 1) i Alipanz - Pen Ciffet 7 OPER HISP HIME 10th TISP CSI MAINTOURS 10th OFER ≅ Assemble (2) Screws (MS24694-52) in vacant holes to secure -19 & -20 frames to -21 plate. Install (12) Helicoils (MS21209-E5-20) wet with primer into tapped holes on sides of -21 plate. Mix R-371 Edge Filler with catalyst per manufacturer's instructions.
Fill exposed edges at top of Back Panel and around periphery of opening in center of Panel. After curing, sand smooth all edges. Break UNTIL FIXTURE IS CLOSED, CLEAN WHITE COTTON GLOVES MUST BE WORN. and tighten uniformly. Attach thermocouple <u>leads and place loaded fixture in oven to cure at</u> 250°F. - 260°F. Hold test coupon for QC notify assembly personnel when 60 minutes.
Provide strip recorder printout and attach edges of -11 & -13 skin around riser strap slot at top of Panel. PRODUCTION ORDER NO. plate on bonding fixture, secure with bolts Disassemble fixture and remove bonded assy. disposition. OPERATION Remove from oven, allow to air cool OPERATIONS INSTRUCTION -Continued) 50°F. has elapsed. Verify above. to this P.R.C. Verify above. OB ORDER NO. UPLR 100 105 110 125 130 120 140 150 1691 : اب \$A ۲i م ي C-15

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Back Panel Assy. - MPES

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DEPT	OPER			OPER N 10th IIR	=	. I =	OPER 111SP 11ME	111/16
3	٠,	FINAL ACCEPIANCE: 1. Verify all operations completed. 2. Verify test coupon as required. 3. Verify parts conform to drawing requirements.						
	1 2 1 1 1 1 1 1 1	(See Note, Pg. 1 of this P.R.C.)						
D _d	160	Hold for next assy.					<u> </u>	
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IIS		REVISIONS	OPERATIONS AFFECTED						-			MATERIAL SPEC						11170
R NO.	D. Wilson		REASON FOR CHANGE								PARTS 15SUED BY	MATERIAL SIZE						
PRODUCTION ORDER NO.	PREPARED 0.	0	PRC DWG RE				,				s LIST	TERIAL	leet 2**				-	
	PLR PLR W 0	QI Y ACCI P I	QĪŸ REJECT				of final assembly.				ASSEMBLY/PARTS LIST		** See Sheet					
Karahi	OWG (101 REV B NO	E	UTY PER NEXT ASSY 1(-1)			og Seat Pan and Motor	drilled and tapped on fils (MS21209-F1-20) will		REG COMP DATE RECEIVED BY	ACCEPIANCE BATE UNIT THE		PART HUMBER REV						
JOB ORDER NO.	16120-1	VESCRIPTION Side Panel Assy.	NO 16100		EFFECTIVITY 001-004	Holes for attach	The (12) Heli-Coils at that time.		SSUED	ACCEPTED (QC)		QTY QTY OATE						
JO	ASSY PART NO	'ESC	YSSY	ASSY SERAL ::0(S)	EFFE	ROTES			ISSUED BY	C-17		O. ASS			1	! !		

STENUEL AERO ENGINEERING CORPORATION

ASSEMBLY PART NO 16120-1

SHEET

_ OF _

a TALLEY INDUSTRIES Company

JOB ORDER NO.

PRODUCTION ROUTE CARD

PRODUCTION ORDER MO.

ASSEMBLY/ PARTS LIST

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1	1	<u> </u>	133 0	الا	-11	 	Skin - Outer, L.H.	
2	1		 		-13	 	Skin-Inner L.H.	
3	3			i	-15	 	Insert, Blank	
4	1		_		-17	 	Rail, L.H.	
5	2			···	-19	 	Doubler, Upper	
6	1				-21		Doubler, Corner, Juter	
	Ť				-23		Doubler, Corner, Inner	
3	_2				-25	1	Doubler, Forward	· ·
9	1			 	-27		Core, Forward	
107	1		1		-29		Core, Center	
Til	1				-31		Core, Upper	T
12	1				-33		Frame, Belt Attach. (Dogbone)	
13	1				-35	Ī	Frame, Forward	
14	1			1	-37		Frame, Bottom L.H.	1
15	1		 		-39	 	Frame, Upper	†
16	1		<u> </u>		-41	 	Boss, Plain	1
17	1		 		-43	 	Boss, Tapsed	
	45		 	 	MS20470-AD5		Rivet	
13 19	12				MS21209-F1-20		Heli-Coils (To be installed on	next assv.)
20	1		 	<u> </u>	MS21209-F4-20	j	Heli-Coil	
21	1				MS27039-1-18	†	Screw	
22	AR		†		R-393-1	1	Adnesive	<u> </u>
23	AR				R-370-13	i –	Adhesive, Foaming	1
24	AR				R-371		Edge Filler (with Catalyst)	
25	AR				R-500		Primer	
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NBLY Side Panel Assy MPES SIREL 3 OF 9	5	IIR HOER HOER HOER HISP LIM			NADC-80	0208-60			
* IATHY INDUSTRIES CAMPANY PRODUCTION ORDER NO.	OF RATION	OPER OPERATIONS INSTRUCTION	10 With Doublers (-19,-23%-25) in place, locate and fit the following components into the bonding fixture: -17 Rail -33 Frame, Belt Attach (Dogbone) -35 Frame, Bottom, L.H.	nch, mg tap #6-	(NOTE: TAPPED HOLES ARE FOR TEMPORARY USE IN FIXTURE, THESE HOLES WILL LATER BE OBLITERATED BY HELI-COILS TAP- See Note Pg. 1)	Mark location of MS27039-1-18 screw between -35 & -33. Drill and tap #10-32 into -33 (Dog bone) Tapped hole should be approx. 1/8" short of going thru. Drill #7 clearance hole in -35 Forward Frame. Temporarily assemble -33 & -35 for further fit-up to fixture.	With transfer punch, mark location of dowel pin holes in =17 Rail, & -35 Forward Frame & -37 Bottom Frame, locate from holes in fixture. Drill 9/64 holes at these locations.	40 in inconspicuous location, steel stamp identify all frames, doublers and skins for future reference, and remove from fixture.	

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Side Panel Assy. (L.H.) SHIET 1-07101 PRODUCTION ROUTE CARD ASSERBET PRODUCTION ORDER NO. STUDIES ALTO UNDESTRUCTIONS CORPORATION P. IAILLY INDISTRUCE CARPORA JOB ORDUR NO.

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	LR OPERATIONS INSTRUCTION	Press -41 Boss, Plain and -43 Boss, Tapped into -33 Dog Bone, -41 Boss goes in Upper hole -43 goes in lower hole. Head of boss should be flush or slightly below flush with inside surface of Dog Bone. If not, partially press out and file or sand head and repress into	Prepare test coupons. (Three are required for each assy) Skins should be 1 1/2" x 4" of .020 thick 7075-773 alum. Cores should be of same core material as used on side panel and should be 1 1/2" x 3".	Once weekly prior to bonding an assembly, lap Shear Test Coupons are to be bonded to verify adhesive strength. Coupons should be made of adhesive strength. Coupons should be made of aluminum of .050" or greater, and should be 1 1/2" wide by 2" to 4" long. Coupons are to be lapped 1/2" end to end and bonded.	65 Verify above and verify cleaning solutions concentrations and temperatures.	Clean all parts except core pieces as follows: 1. Degrease with Kinwipes saturated with MEK. 2. Clean With Dakite cleaner at SID concentration and 140°F. for 10 - 15 minutes. 3. Ringe in cold flowing water for 3 minutes.	break free film. 11 minutes in 140 d (32,3 - 40,0 02, t.) with water to	#5 & #6.
	I JOPER	1 7	J		9			
	DEPT	\$	PA		3	V.		

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	THE COLD		distribute.
-	HIMEL ALTO ENGINEENING CÓINGHAINH	A COLUMN TO THE PARTY OF THE PA	STREET AND A STREET
-		# 11 12 11	ALVIIIA I

2 =			ROUTE CARD ASSERBLY	Side	e Panel	el Assy.	ı	MPES	•
I	JOB ORDER NO.	R NO. PRODUCTION ORDER NO.			1	SHEET	9		o.
EE		0P.ERA 1.10B			MATHICUTES	li .		SIGN OF	_
	# 7.40	OPERALIONS INSTRUCTION		5	_ = E	# TEST		OPER INSP	E
2	- 96	Verify above.				1			;
РА	160	Clean Core pieces (-27,-29 & -31) by immersing in MEK drain dry. Wrap pieces in Kraft paper. Handle with cotton gloves.	EK and allowing to h clean white						
S .	105	verify above.			1 1		· · · · · · · · · · · · · · · · · · ·		: 1 1 !
&	110	Clean bonding fixture with Kimwipe saturated with MEK. mold release compound to required areas.	EK. When dry, apply						1 1 1
ЬА	120	Remove adhesives (R. 393-1 & R. 370-B) from freezer.	Allow to than before		11:1				80208-6
		NOTE: Clean white cotton gloves required for the footperations 130 thru 140. NOTE: Q.C. witness oper, 130.	the following						
PA	130	Cut pieces of adhesive R-393-1 to match each skin and	nd each doubler,				1		<u> </u>
		NOTE: ADMESTVE MAY BE PIECED TOGETHER IF WEEDED, BUT JOINT BE THIGHT. LAY UP ASSEMBLY IN THE FOLLOWING ORDER:	UT JOINT SHOULD		1			1	1
	1	1. Place -25 Forward Doubler in position over .012 prime side up. 2. Place -23 Corner Doubler in position prime side 3. Place -19 Upper Doubler in position, prime side	.012 Brass Shim, ide up.						i

그 그 이 이 이 이 아이를 가는 것이 되었다. 그는 그는 그는 그는 그는 그는 그는 그는 그는 그는 그는 그는 그는									
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MITURE INSTRUCTION ACTION ACTION MICHIGAN M	30 OK	DER NO.	PRODUCTION ORDER NO.			SHLE	7	5	6
190 Continued 4. Per lackings from R-393-1 film adhesive pieces that were pre-cut 4. Per lackings from R-393-1 film adhesive pieces that were pre-cut 5. With Upper Space in continued 6. Per lackings from R-393-1 film adhesive pieces that were pre-cut 7. Prec lackings from R-393-1 film adhesive piece pre-cut and 8. Per lackings from R-393-1 film adhesive piece pre-cut and 9. Prace -39 Upper frome in position. 8. Prace -39 Upper frome in position and secure it and bog bone to 10. Prace -39 Upper from in position and secure of fixure with 8. Prace -39 Upper frome in position and secure of fixure with 10. Prace -30 Upper from in position and secure of fixure with 11. Cut R-370-8 Gounn adhesive into strips approximately 1/2" Mide. 12. Place -37 Distance from the position and secure of fixure members. 13. Place -17 Rail for position. 14. Per lackings from R-393-1 film adhesive pre-cuts and place in position on the position on the position on the position on the position on the position on the position on the position on the position on the position on the position on the position on fixure. 13. Place -25 Greated Boubler in position on fixure. 14. Place -25 Greated Boubler in position on fixure. 15. Place -25 Greated Boubler in position on fixure. 16. Place -10 Upper Boubler in position on fixure. 17. Place -25 Greated Boubler in position on fixure. 18. Place -10 Upper Boubler in position on fixure.	! !		OPLRATIOR		¥.	HOURS		SIGN	, =
4. Pet Deskings from R-393-1 film adhesive pieces that vere piecut and pet Deskings from R-393-1 film adhesive pieces that vere piecut proper Space in correct position on fixture, place -13 skin in position. 6. With Upper Space in correct position on fixture, place -13 skin in position on position on fixture, place -13 skin position. 7. Pre-assemble -33 Dog Bone to -35 Forward Frame with MS2039-1-18 8. Crew and place in position. 8. Place -17 Rail in position. 9. Place -17 Rail in position. 10. Place -27 Upper Frame in position and secure it and Dog Bone to fixture with M6-32 screws. 9. Place -17 Rail in position. 10. Place -27 Bottom frame in position and secure to fixture with M6-32 screws. 11. Cut R-370-B Framing adhesive into strips approximately 1/2" wide. 12. Place -19 Upper Frame in position and secure in position on all frame members. 13. Wrap each -15 liser with strip of R-370-B adhesive and place in position on secure bounder in position primed side down. 14. Pet backings from R-39-1 film adhesive pre-cuts and place in position on skin position on skin position, primed side down. 18. Place -19 Upper Doubler in position, primed side down. 19. Place -21 Corner Doubler in position, primed side down. 20. Mare up test coupons and place in position on fixture.	<u> </u>		NS INSTRUCTION		ŝ	::=∤	13	res	- E
4. Peel backings from Rand place on each of 5. With Upper Spacer in in position. 6. Peel backings from Replace on top of skin. 7. Pre-assemble -33 Bog Screw and place in pos 1 Jace -19 Upper Frame fixture with \$\mathbb{H} 6-32 \text{ sc} 9. Place -17 Rail in pos 10. Place -17 Rail in pos 10. Place -17 Bottom Fram \$\mathref{H} 6-32 \text{ screws}. 11. Cut R-370-8 foaming a \$\mathref{H} 6-32 \text{ screws}. 12. Place -17 Bottom Fram \$\mathref{H} 6-32 \text{ screws}. 13. Weel backings from R-19 Place -11 skin on top 16. Peel backings from R-19. Place -25 Forward Boul 18. Place -25 Forward Boul 19. Place -25 Forward Boul 19. Place -25 Forward Boul 19. Place -19 Upper Boul 19. Place -19		! ——	ned			1	i	<u> </u>	<u> </u>
5. With Upper Spacer in in position. 6. Peel backings from R-place on top of skin. 7. Pre-assemble -33 Dog Screw and place in pos screw and place in pos place -19 Upper Frame fixture with #6-32 sc 9. Place -17 Rail in pos 10. Place -17 Rail in pos 11. Cut R-370-B foaming a #6-32 screws. 11. Cut R-370-B foaming a Apply these strips to place Core pieces int into position in Forw 14. Peel backings from R-top of assembly. 15. Place -11 skin on top 16. Place -25 forward Dou 18. Place -25 forward Dou 18. Place -21 Corner Doub 19. Place -21 Corner Doub 19. Place -21 Corner Doub 19. Place -21 Corner Doub 19. Place -21 Upper Doub 19. Make up test coupons		4: Pe	backings from R-393-1 film adhesive pieces that vere			i		•	
6. Peel backings from R- place on top of skin. 7. Pre-assemble -33 Dog Screw and place in po 8. Place -39 Upper Frame fixture with #6-32 sc 9. Place -17 Rail in pos 10. Place -17 Rail in pos 11. Cut R-370-8 foaming a Apply these strips to 12. Place Core pieces int 13. Wrap each -15 insert into position in Forw 14. Peel backings from R- top of assembly. 15. Place -11 skin on top 16. Peel backings from R- position on skin. 17. Place -25 Forward Dou 18. Place -21 Corner Doub 19. Place -21 Corner Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub 19. Place -10 Upper Doub			the three doublers. correct position on fixture, place -13	:				:	
Place on top of skin. 7. Pre-assemble -33 Dog Screw and place in po 8. Place -39 Upper Frame fixture with #6-32 sc 9. Place -17 Rail in pos 10. Place -17 Rail in pos 11. Cut R-370-B foaming a #6-32 screws. 12. Place Core pleces int 13. Wrap each -15 insert 14. Peel backings from R- top of assembly. 15. Place -11 skin on top 16. Peel backings from R- position on skin. 17. Place -25 Forward Dou 18. Place -25 Forward Dou 19. Place -25 Forward Dou 19. Place -25 Forward Dou 19. Place -25 Forward Dou 19. Place -25 Forward Dou 19. Place -19 Upper Doub 19. Place -10 Upper			ic from 0 303 1 611m adhering as a second		1				
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13. Wrap each -15 Insert into position in Forw 14. Peel backings from R-top of assembly. 15. Place -11 skin on top 16. Peel backings from R-position on skin. 17. Place -25 Forward Dou 18. Place -21 Corner Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Werify operation 130.		:	o inside edges of Rail			1		1	-
14. Peel backings from R- top of assembly. 15. Place -11 skin on top 16. Peel backings from R- position on skin. 17. Place -25 Forward Dou 18. Place -25 Forward Dou 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 19. Place -19 Upper Doub 10. Make up test coupons			with strip of R-370-B adhesive and		<u> </u>	:			-
135 Verify operation 130.			2	!				- 1	!
15. Place -11 skin on top of assembly. 16. Peel backings from R-393-1 film adhesive pre-cuts and place position on skin. 17. Place -25 Forward Doubler in position primed side down. 18. Place -21 Corner Doubler in position, primed side down. 19. Place -19 Upper Doubler in position, primed side down. 20. Make up test Coupons and place in position on fixture.	-		1	10n on	; ;				
16. Peel backings from R-393-1 film adhesive pre-cuts and place position on skin. 17. Place -25 Forward Doubler in position primed side down. 18. Place -21 Corner Doubler in position, primed side down. 19. Place -19 Upper Doubler in position, primed side down. 20. Make up test coupons and place in position on fixture.			p of		:				
17. Place -25 Forward Doubler in position primed side 18. Place -21 Corner Doubler in position, primed side 19. Place -19 Upper Doubler in position, primed side 20. Make up test coupons and place in position on fix 135. Verify operation 130.	 .	• •	-393-1 film adhesive pre-cuts and place		: !			<u> </u>	
18. Place -21 Corner Doubler in position, primed side 19. Place -19 Upper Doubler in position, primed side 20. Make up test coupons and place in position on fix 135. Verify operation 130.			in position primed		1				•
19. Place -19 Upper Doubler in position, primed side 20. Make up test coupons and place in position on fill 135 Verify operation 130.	-		bler in position, primed side	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-	:		-	1
135 Verify operation 130.		_	ler in position, primed side	1					
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			operation 130.		•			<u> </u>	· :
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=	A CAMP IN THE CARD PRODUCTION ROUTE CARD	ASSERIBLY MANE	Side	Side Panel AssyMPES	syM	PES	
JOB ONDER NO.	NO. PRODUCTION ORBER NO.	:		SHR E1	ဆ	6 30	
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OPLR	UPLIANT TWISTRUCTION		200 MI		1 =	เมาะเล	_ <u>E</u>
140	Verify dowel pin holes are aligned. Place upper and lower clamp plates on fixtue. Put 1/8" dia x 1 1/2" wooden dowels in place. Verify that fixture spacer plates are seated between Boublers and not riding on edge of Doublers. Assemble clamp bolts and tighten uniformly.		1 1 1				
145	Verify above.		<u> </u>				
150	Attach thermocouple leads and place loaded fixture in oven. Set oven thermostat for $250^9 F$, to $260^9 F$.				•	•	
160	Monitor temperature and notify assembly personnel when 60 minutes at 250°F. has elapsed. Provide strip recorder print-out and attach to this PRC.					-	
165	Verify above.						1
170	Remove from oven and allow to air cool. Disassemble fixture and remove bonded assy. Nold test coupons for (AC disposition.						
180	locate and mark holes for rivets thry rail. Drill each with #21 drill. Assemble rivets, MS20470-AD5, head out, and set.				·		. i '
190	Install (1) Heli-Coil, MS21209-F4-20, wet with primer, into lower Boss	Y				1	:

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Side Panel Assy.	(R.H.) MPES	OTY ACCEPT	Q.A.		SEVISIONS		5.6.95	c
1557 1557 PARI 110	IQTY PER NEXT ASSY	QTY REJECT	PRC DWG REA	REASON FOR CHANGE	OPERATIONS AFFECTED	DATE	PREP	APPR
ASSY SERIAL RO(S)								
LITECTIVITY 601-004								
Holes for attaching Seat will be located drilled	Seat Pan and Motor Tied and tanned on	Support Plate						
(12) Heli-Coils hat time.	1209-F1-20)	l be			•			
DANT W D 15504 D	NEG COMP DATE							
ISSUED BY BACE NO RECD ACCEPTED (UC)	RECEIVED BY DATE W D COMP ACCEPTANCE DATE UNIT THE							
		ASSEMBLY/PARTS LIST	151	PARTS ISSUED BY				
TIEM OIY OIY OIY DATE PART	PART NUMBER	REV PART NAME/MATERIAL	AL.	MATERIAL SIZE	MATERIAL SPEC		RAW MATE /CERT NO	≘
		** See Sheet 2**	2**					
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ASSEMBLY PART NO

16120-2

a TALLEY INDUSTRIES Company

STENCEL AERO ENGINEERING CORPORATION

PRODUCTION ROUTE CARD

SHEET ___ __ OF _

JOB ORDER NO._ PRODUCTION ORDER NO._ ASSEMBLY/PARTS LIST PART NUMBER REMARKS REY DESCRIPTION EMIQTY IQTY -12 Skin - Outer, R.H. Skin - Inner R.H. -14 Insert, Blank 3 -15 -18 Rail, R.H. -19 Doubler, Upper Doubler, Corner, Outer Doubler, Corner, Inner Doubler, Forward -22 Core, Forward Core, Center -31 Core, Upper -34 Frame, Belt Attach. (Dogbone) -35 Frame, Forward Frame, Bottom R.H. -38 Frame, Upper Boss, Plain -41 Boss, Tapped MS20470-AD5 Rivet ÷5 ; MS21209-F1-20 Heli-Coils (To be installed on next assy.) MS21209-F4-20 Heli-Coil MS27039-1-18 Screw R-393-1 Adhesive <u>-2</u>2 R-370-13 Adhesive, Foaming Edge Filler (with Catalyst) 유-371 12 R-500 Prim<u>er</u>

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	JOB ORDER NO.		MAM	SHILLI	ر ا	6 10
81.30	OPERATIONS INSTRUCTION	5 1;	<u> </u>	∷≡⊨		OPTR INSP
10	With Doublers (-19, components into the -18 Rail -34 Frame, -35 Frame,			Y TOTAL	<u> </u>	
	With transfer punch, mark location of attach, holes on -34 -38 & -39, Orill and tap #6-32 x 1/4" at each location.				:	
	(NOTE: TAPPED HOLES ARE FOR TEMPORARY USE IN FIXTURE. THESE HOLES WILL LATER BE OBLITERATED BY HELI-COILS TAP - See Note Pg. 1)				<u>;</u> ;	
50	Mark location of MS27039-1-18 screw between -35 & -34. Drill and tap #10-32 into -34 (Dog bone). Tapped hole should be approx, 1/8 short of going thru. Drill #7 clearance hole in -35 Forward Frame. Temporarily assemble -34 & -35 for further fit-up to fixture.					
30	With transfer punch, mark location of dowel pin holes in -18 Rail, & -35 Forward Frame & -38 Bottom Frame, locate from holes in fixture. Drill 9/64 holes at these locations.					
40	In inconspicuous location, steel stamp identify all frames, doublers and skins for future reference, and remove from fixture.		<u> </u>			÷
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Side Panel Assy. (R.H.) MPES	6 .80	STGR	OPTR INST		1 1			1 Managara 1 Ma	
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ASSEMBLY HAN			j. .1				es.		
* IMITY INDUSTRIES CARROOM PRODUCTION ROUTE CARD AS	IN ORDLR NO.	OPT RATION	DEPT OPER OPERATIONS INSTRUCTION	Press -41 Boss, Plain and -43 Boss, Tapped into -34 Dog Bone; -41 Boss goes in Upper hole, -43 goes in lower hole. Head of boss should be flush or slightly below flush with inside surface of Dog bone. If not, partially press out and file or sand head and repress into position.	should be 1 1/2" x 4" of .020 thick 7075-T73 alum. Cores should be of same core material as used on side panel and should be 1 1/2" x 3".	Once weekly prior to bonding an assembly, lap Shear Test Coupons are to be bonded to verify adhesive strength. Coupons should be made of adhesive strength. Coupons should be made of aluminum of .050" or greater, and should be 11/2" wide by 2" to 4" long. Coupons are to be lapped 1/2" end to end and bonded.	65 Verify above and verify cleaning solutions concentrations and temperature	Clean all parts except core pieces as follows: 1. Degrease with Kimwipes saturated with MEK. 2. Clean with Oakite cleaner at SID concentration and 140°F 150°F. 3. Rinse in cold flowing water for 3 minutes. 4. Check for water break free film. If water break occurs, repeat #2 & #3. 5. Immerse for 10 - 11 minutes in 140°F. to 150°F. solution of Sulphuric Acid (32.3 - 40.0 oz. wt.) and Sodium Dichromate (3.3 - 4.7 oz. wt.) with water to make one gallon solution. 6. Rinse with cold flowing water for 3 minutes. 7. Check for water break free film. If water break occurs, repeat #5 & #5 & #6.	
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PRODUCTION ROUTE CARD ASSIBILITY Side Panel Assy. - MPES

		FART TO TAKE T	PRODUCTION ORDER NO. ORTHALLUM PRODUCTION ORDER NO. ORTHALLUM ORTHALLUM ORTHALLUM PRODUCTION ORDER NO. ORTHALLUM In Fraft paper. Händle with EK and allowith in Fraft paper. Händle with clean white to required areas. Lo required areas. Out gloves required for the following have 130. or gloves required for the following have 140. Fr. 130. E-393-1 to match each skin and each double pitche focition over 1012 Brass Shim, boubler in position over 1012 Brass Shim,	erify above. lean Core pieces (-27 rain dry. Wrap pieces outon gloves. lean fore pieces (-27 rain dry. Wrap pieces outon gloves. lean bonding fixture vold release compound grac outon gloves. erify above. erify above. old release compound fixture vold release compound graund fixture vold release compound up incolling to avoid grau operations 130 to perations of adhesive of speces of adhesive of speces of adhesive of prime side up.	JOB ORDER 05 95 95 PA 130 PA 130 PA 130
			PIECEU FOGETHER IF NEEDED, BUT JOTHI SHOUL OF ASSLIBLY IN THE FOLLOWING ORDER:	, =	
, =			R-393-1 to match each skin and each double	Cut pieces of adhesive	130
Cut pieces of adhesive NOTE: ADHESIVE NAY BE			ı 140. 130.	Operations 130 0.C. witness op	-
nulf: Q.C. witness operations lad the nulf: Q.C. witness operations of adhesive nulf: AblifsIVE NAY BE BE THIGHT. LAY BE			loves		
HOTE: Clean white cott operations 130 the NOIF: Q.C. witness operations of adhesive MOTE: ADHESIVE NAY BE BE THIGHT. LAY L			1-1 & R 379-B) from freezer. Allow to thay king.		120
Remove adhesives (R-193-1 & R 379-B) from freezer. Allow to thay Lefo unrolling to avoid cracking. NOTE: Clean white Cotton gloves required for the following operations 130 thru 140. NOTE: Q.C. witness oper. 130. Cut pieces of adhesive R-393-1 to match each skin and each doubler. MOTE: ADHESIVE MAY BE PIECED FOGETHER IF NEEDED, BUT JOIN SHOULD. BE THICHT: LAY UP ASSINBLY IN THE FOLLOWING ORDER.		appl	ith Kimwipe saturated with MEK. to reguired areas.	Clean bonding fixture mold release compound	0.00
Clean bonding fixture with Kimwipe saturated with MEK. When dry, applying to reguired areas. Remove adhesives (R-393-1 % R 379-B) from freezer. Allow to than L-founful operations 130 thru 140. ROJE: Clean white cotton gloves required for the following operations 130 thru 140. ROJE: 0.C. witness oper. 130. Cut pieces of adhesive R-393-1 to match each skin and each doubler. BE THEOUT. LAY UP ASSINGLY IN THE FOLLOWING ORDER:					105
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Clean Core pieces (-27,-29 & -31) by immersing in MEK and allowing to drain dry. Wrap pieces in Fraft paper. Handle with clean white cutton gloves. Verify above. Clean bonding fixture with Kimwipe saturated with MEK. When dry, appl mold release compound to required areas. Remove adhesives (R-193-1 & R-370-B) from freezer. Allow to than L-fo unrolling to avoid cracking. HOTE: Clean White cotton gloves required for the following operations 130 thru 140. HOTE: Q.C. witness oper. 130. Cut pieces of adhesive R-393-1 to match each skin and each doubler. BY THIGHT: LAY UP ASSUMBLY IN THE FOLLOWING ORDER.				Verify above.	. ⁹ 95.
Verify above. Clean Core pieces (-27,-29 & -31) by immersing in MEY and allowing to drain dry. Wrap pieces in Kraft paper. Handle with clean white cotton gloves. Verify above. Clean bonding fixture with Kimwipe saturated with MEK. When dry, apply mold release compound to regulated areas. Remove adhesives (R-193-1 & R-379-B) from freezer. Allow to thay L-fo unrolling to avoid cracking. HOTE: Clean white cotton gloves required for the following operations 130 throunds. Cut pieces of adhesive R-393-1 to match each skin and each doubler. MOTE: ADMESTAC MAY BE PHECED FOCETHER IF NEEDED, BUT JOINT SHOULD BE THEME.	In the Hoth	13 <u>13 13 13 13 13 13 13 13 13 13 13 13 13 1</u>		OPERALTONS INSTRUCTION	arta arta
orth ortholions instruction 95. Verify above. 160 Clean Core pieces (-27,-29 & -31) by immersing in MEK and allowing to drain dry. Urappieces in fraft paper. Hondle with clean white conton gloves. 105. Verify above. 110. Clean bonding fixture with Kimwipe saturated with HEK. When dry, aprilmold release Compound to required areas. 110. Clean bonding fixture with Kimwipe saturated with HEK. When dry, aprilmold release Compound to required areas. 110. Clean bonding fixture with Kimwipe saturated for the following operations and its conton gloves required for the following operations 130 thru 140. 110. Cut pieces of adhesive E-393-1 to match each skin and each doubler. 110. Cut pieces of adhesive E-393-1 to match each skin and each doubler. 110. Cut pieces of adhesive E-393-1 to match each skin and each doubler.	mour:		OP RALION		
ANTIONS INSTRUCTION erify above. erify apove. erify above. erify are graft properties are allower arequired for the following operations are area. erify above. erify above. erify above. erify above. erify above. erify above. erify above. erify above. erify above. erify above. erify above. erify allower. erify above. erify allower. erify above. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allower. erify allowe	9 1	Marie Control of the	PRODUCTION ORDER NO.		2 3030
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INDITIONAL TORROLLARY MUSTIMITS CANDON PRODUCTIONAL MOUTE CARD MASTIMITY PRODUCTIONAL MOUTE CARD MASTIMITY OUT PAILING OUT PAILING OUT PAILING OUT PAILING OUT PAILING OUT PAILING PEED BACKINGS from R-393-1 film addressive pieces that vere pre-cut and place on each of the three doublers. With Upper Spacer in correct uposition on fixture, place -14 skin in position. Pre-assemble -39 double me -393-1 film addressive piece pre-cut and place on top of skin. Place -39 backings from R-393-1 film addressive piece pre-cut and place on top of skin. Place -39 backings from R-393-1 film addressive piece pre-cut and bog Bone to fixture with its-2 sereus. Place -39 backing from in position and secure it and bog Bone to fixture with its-2 sereus. Place -39 backing from in position and secure it and bog Bone to fixture with its-3 sereus. Place -39 backing from R-393-1 film addressive pre-cut and place in position on fixture. Place -10 backings from R-393-1 film addressive pre-cut and place in position on Skin. Place -25 forward bout-ter in position, primed side down. Place -25 forward bout-ter in position, primed side down. Place -19 Upper boubler in position, primed side down. Place -19 Upper boubler in position, primed side down. Place -19 Upper boubler in position, primed side down. Place -19 Upper boubler in position, primed side down. Place -19 Upper boubler in position, primed side down. Place -19 Upper Boubler in position, primed side down. Place -19 Upper Boubler in position, primed side down.	MUSTIMIS CANDON MINIMIS METANCTION MINIMIS M	16120-2	Panel Assy.	511111	₹				:	•									_
ATTURE TRETRUCTION IN THURS TRETRUCTION IN THURS TRETRUCTION In position. Peel backings from R Peel backings from R Place -39 Upper From R Place -39 Upper From R Place -38 Bottom From R Place -38 Bottom From R Place -38 Bottom From R Place -38 Bottom From R Place -38 Bottom From R Place -18 Rail in po Place -38 Bottom From R Place -29 Forward Po Place -25 Forward Po Place -25 Forward Po Place -25 Forward Po Place -25 Forward Po Place -25 Corner Bown Place -25 Corner Bown Place -25 Corner Bown Place -19 Upper Bown Place -	ATTORS INSTRUCTION In nued Peel backings from R Pace an top of skin Place and place in position. Place and place in position. Place and place in position. Place and place in position. Place and place in position. Place and place in position frame fixture with #6-32 screws. Cut R-370-8 fooming Apply these strips to place core pieces in Wrap each and place in Former food position in Former place assembly. Place assembly.	. E			=	Ξ.		· ·						uo u					_
			PRODUCTION ROUTE CARD	PRODUCTION ORDER NO.	JULIVITIO	OPT RATIONS INSTRUCTION	Continued 4. Peel backings from R-393-1 film adhesive	and place on each of the three doublers. With Upper Spacer in correct position on	6. Peel bāckings From R-393-1 film adhesive piece pre-cut and blace on top of skin.	Place fixtur		Cut R-370-B foaming Apply these strips t	Place Core pieces in Wrap each -15 Insert into bosition in For	Peel backings from R ton of assembly	Place _12 skin on top of assembly. Peel backings from R-393-1 film adhesive pre-cuts and place	position on skin. Place -25 Forward Doubler in position primed Place -22 Corner Doubler in position, primed	Place -19 Upper Doubl Makeiup test coupons		

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PRODUCTION ROUTE CARD ASSERBLY

IMIT Side Panel Assy. -MPES

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PA	140			<u>≅</u>	<u> </u>			
<u>ن</u> ب	146	Ver ify above.						
٧d	951	Attach thermocouple leads and place loaded fixture in oven. Set oven thermostal for 250°F, to 260°F.					**	
TEA	091	Monitor temperature and notify assembly personnel when 60 minutes at 250°F. has elapsed. Provide strip recorder print-out and attach to this PRC.			· · · · · · · · ·			
<u> </u>	165	Verify above.						
A .	0/1	Remove from oven and allow to air cool. Disassemble fixture and remove bonded assy. Hold test coupons for UC disposition.			!		1 ;	
PA	όяὶ	Locate and mark holes for rivets thru rail. Drill each with #21 drill. Assemble rivets, MS20470-A05, head out, and set.		 			1 1	
PA	061	Install (I) Heli-Coil, MS21209-F4-20, wet with primer, into lower Eoss.			: -		3	
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		PARE NO	Ä	7-02191		
-	INTERPRETATION PRODUCTION ROUTE CARD	ASSEMBLY NAME	Side Pan	Side Panel Assy.	- MPES	
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	OFFICIALION		IV.	HAMIOURS	S	SIGN OF
2	OFTRATIONS INSTRUCTION		OF TR	THSP THE TOTAL	Carl a rao	, 13H
195	Verify above.	'	;		,	i ,
		,	-			
200	Hix R-371 Edge Filler with catalyst per manufactuers instructions. Fill exposed edges at front and top of panel. After B hrs. cureing, sand smooth. Break sharp edges as required.	-				
	:					
		:	•			
Ç0.2	Final Acceptance: 1. Verify all operations completed.		-			
	2. Verify test coupons as required.	:				
	3. Verify parts conform to drawing requirements.	!	:	-		
	(See Hote, Pg. 1 of this PKC).	! :	i ;			NAI
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210	Hold for next assy.	1	1			802
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10 10 10 10 10 10 10 10	CRIPTION •	Seat Pan As			OLY ACCEPT		1	27.0.2.2	SAG	0.715	6	
1 1 1 1 1 1 1 1 1 1	2	0	: ≿	1(-1)	QTY RE JECT	PRC DWG REV REV	REASON FOR	2	OPERATIONS AFFECTED	DATE	1	APPR BY
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1 155 10 155 10 10 10 10	NATE NO RECONCEPTED (UC)		ACCEPTANCE D	, iii								
1 Skin, Lower Skin, Upper				ASSEMBLY/PART	s LIST	PARTS	ISSUED BY					
1 Skin, Lower 13 Skin, Upper (Both parts are identical prior to bonding) 1 -15 Core Inserts Adhesive (R-393-1) Adhesive (R-393-1) Adhesive (R-370-8) Primer (R-500) Cdge Filler (R-371) Cdge Filler (R-371) Thimpool-250 Smill in Of	QIY QIY	OAIC		<u> </u>	PART MAME/MAI	ERIM	MATERI	AL SIZE			ML /CER	2
1					Skin, Lower Skin, Upper		(Both	parts are		or to b	(Bui puo	
18		1	-15	<u>:</u> : :	Core		1					
Ak Ak Ak Ak Ak Ak Ak Ak Ak Ak Ak Ak Ak A	¥:38		-17		Inserts Adhesive (R-	393-1)						
111A0090/-258 SHEET 1 OF				1 :	Adhesive (R- Primer (R-50 Edge Filler	-370-8) 00) (R-371)						
SHEET 1 OF				· ·								
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10. Wrap parts individually in Kraft paper.	Wrap parts individual

	5 10	SIGN OF	OPER HISP TIME					NADC-80	0208-60		
3	E 11111S	MARINOURS	OPER THSP TIR HOLD TIR HOLD								, , , , , , , , , , , , , , , , , , ,
n.n.n.l	PRODUCTION ORDIER NO.	OPLPA110H	OPERATIONS INSTRUCTION	Verity above.	Apply R-500 primer to inserts & to numbered side of skins. Primer should be applied .0001 to .0003 film thickness. Allow to air dry 30 min. and oven cure for 30 minutes at 235°F. to 250°F. Upon removal from oven, revarab in Kraft paper.	NOIE: No more than 16 hours should elapse between cleaning and priming.	Verify above.	Clean Core (-15) by immersing in MEK and allowing to drain dry. Wrap pieces individually in Kraft paper. Handle with Clean cotton gloves.	Verify above.	Clean bonding fixture with Kimwipe saturated with MEK. When dry, apply spray-on mold release.	Remove both film adhesives from freezer. Allow to reach room temperature before unrulling. Apply film adhesive (R-393-1) to bottom skin on primed side and trim excess. (Assemble skin to fixture. Cut film adhesive (R-370-B) into strips approx. 9/16 wide. Roll one piece of strip around each Insert (-17) and place fisert on dowel pin in fixture. Place core (-15) in position in fixture. Apply film adhesive (R-393-1) to top skin on primed side and trim excess. Assemble top skin in position on top of already
	JOB ORDER NO.		0FER	32	30		<u> 3</u>	40	45	05	09
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PA 60 CC CC A A A A A A A A A A A A A A A A									
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		OPTRALLORS INSTRUCTION	<u>!-</u>	OPER IIR NO	13 E	insp	OPER INSP	THSP-	· · · · · · · · · · · · · · · · · · ·
	3	Continued assembled parts. Prepare test coupon and place on fixture alongside -1 assy. Place top Plate on bonding fixture, secure with bolts and tighten uniformly.				1		<u> </u>	
		ROTE: UNTIL FIXTURE IS CLOSTO CLEAN COTTON GLOVES MUST BE USED.				,			
9 	9	Verify above:			•			1 1	
V Vd	20	Attach thermocouple lead and place loaded fixture in oven to cure at 250°F, to 260°F.							NAI
18A 8	08	Honjtor temperature and notify assembly personnel when 60 minutes at 250 F. has elapsed. Provide strip recorder printout and attach to this P.R.C.							oc-80208 - 60
ж Эд	33.	Verify above.		,	. :		i		
PA 9	. 06	Remove from oven and allow to air cool. Disassemble fixture and remove bonded assy. Hold test coupon for 0.C.				1			'
A.	joč	Hand file 45° x .31 notch .75 wide (2) places at rear of assy. Collapse Core in that area to allow room for edge filler.							
PA 1	011	Mix Edge Filler (R-371) according to manufacurers instructions and fill exposed edges around seat pan. Allow to cure and shape smooth.				11 Aby	11Ab0907-258	SECTION SECTIO	

NADC-80208-60	NAD	DC-8	30:	20	8-	60
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===	OPLR	OFTRALLORS INSTRUCTION		<u> </u>	OPER TOTAL	Ince IR Hoth	OPTR INSP		
₹.	2	FINAL ACCIPTANCE: 1. Verify all Operations 2. Verify test coupon as 3. Verify parts conform	completed. required.			 	1		
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ټ′	021	Hold for next assy.			1				
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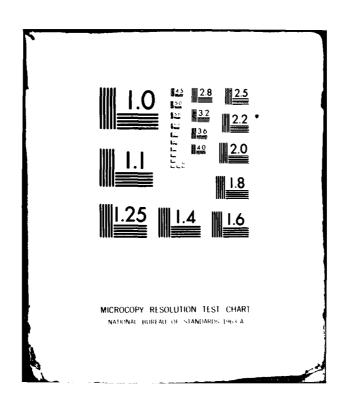
0189 DATE NUMBER REV PARE NAME/MATERIAL H 0 1550 BY -11 H 450 Sheet, FWD -13 Face Sheet, AFT Honey Comb Core -15 Frame Bottom -10 Frame Bottom -10 Frame Bottom -22 Frame R.H. R-393-1 R-393-1 Adhesive, (100) Primer -100 Primer -100 -100				Ì	ASSEMBLY/PARTS LIST	PARIS ISSUED BY		
-11 face Sheet, FWD -13 face Sheet, AFT15 Honey Comb Core -17 frame Bottom -19 frame L.H21 frame R.H22 Adhesive, Structural R-370-B Adhesive, (100) R-500	Y QTY QTY DATE	BY PART RUM		REV	PARI NAME/MATERIAL	MATERIAL SIZE	MATERIAL SPEC	RAM MATL/CERT NO
13 Face Sheet, AFT. 15 Honey Comb Core -15 Frame Bottom -10 Frame L.H. -21 Frame R.H. R-393-1 Adhesive, Structural Adhesive, (100) Primer Primer Hilmon 2.44 Hilmo	-		1-		lace Sheet, FWD			
-15 Honey Comb Core -17 Frame Bottom -19 Frame L. H. -22 Frame R. H. R-393-1 Adhesive, Structural Adhesive, (100) Primer			-13		face Sheet, AFT.			
-17 Frame Bottom -19 Frame 10p -21 Frame L.H22 Frame R.H. R-393-1 Adhesive, Structural Adhesive, (100) R-500 Primer	-		-15		Honey Comb Core			
19 Frame 10 Frame 1. 1. 1. 22 Frame 1. 1. 1. 22 Frame 1. 1. 22 Frame 1. 1. 22 Adhesive, Structural Adhesive, (100) R-500 Primer 111 Annago, 24.8 244 1. 1. 1. 1. 1. 1. 1.			-17		Frame Bottom			
R-393-1 R-370-B R-5 <u>00</u> Primer			-19		Frame 10p	1		
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R-370-B Adhesive, (100) R-500 Primer			-22		Frame R.H.			
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R-500 Primer	· —	R-370-			Adhesive, (100)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
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orth urraktud. Instruction 10 with stor (-is) in place, locate and the frame member stored (-is) and place, locate and the frame member stored (-is) and position that the horthest stored (-is) and the member stored (-is) and the member stored (-is) and the member stored (-is) and the member stored (-is) and the member (-is) and the member stored (-is) and the member stored (-is) and the member stored (-is) and the member stored (-is) and the member stored (-is) and the member stored (-is) and member stored (-is) and member stored (-is) and member stored (-is) and member stored (-is) and member stored (-is) and the member stored (-is) and			OFLPATION		MAIH	CHIRS		31GR 011	=
10 with stin (-13) in place, locate and side, 1/3-19,-21 & -/2) in bonding fixture needers for future assy. With transical attach holes from bonding fixture of cas h frame member, (More Epped firsture and are in proper location. L. Helistoil tap - See Mote Pg. 1.) 70 (it and identity skins (II &-13) with needer) set in the following manner; Shins a frame members— 1. Degrees with Yim wipes saturally. Chear party in the following water at Slange in cold flowing water for S. Kinse in cold flowing water for J. Check for water break free fill repeat #2 & #3. 2. Immerize for Mater break free fill repeat #2 & #3. 3. Kinse in cold flowing water for Jack fine fill repeat #2 & #3. 4. Immerize for Moter break free fill repeat #2 & #3. 5. Immerize for Moter break free fill repeat #3. 4. Ammerize for Moter break free fill repeat #2 & #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3. 5. Immerize for Moter break free fill repeat #3.	1.4		OPERALIBIES TRSTRUCTION	3	= 10 10 10 10	HR 1911	_ <u></u>	± 3. ± 3. ± 3. ± 3. ± 3. ± 3. ± 3. ± 3.	<u> </u>
	년 - 전		With stin (-13) in place, locate and fit frame members [-17,-19,-2] & -22) in bonding fixture. Steel stamp identify [-17,-19,-2] & -22) in bonding fixture. Steel stamp identify [-17,-19,-2] & -22) in bonding fixture. Drill and tap #6-32X4 two places [-2] attach holes from bonding fixture. Orill and tap #6-32X4 two places [-2] attach holes from bonding fixture. Orill and tap #6-32X4 two places [-2] tribute and are in proper location. These holes will later be oblitterated [-2] Hell-toil tap - See Note Py. I.)						
3 章 第 2 章 第 3 章 3 章 3 章 3 章 3 章 3 章 3 章 3 章 3 章 3 章	ख. स		Out and identity skins (11 &-13) with steel stamp in the entplengus location.			· · · · · · · · · · · · · · · · · · ·	-		
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	.).(1		Ver II, cleaning solutions concentrations and temperatures.			;			
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DESIGN, FABRICATION, AND TESTING OF THE MAXIMUM PERFORMANCE EJE--ETC(U)
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NADC-80208-60 NL AD-A092 292 UNCLASSIFIED 2 o 2 END DATE 1 81



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		PRODUCTION ROUTE		OPLRALION	CHERATIONS INSTRUCTION	Check for water break free film. occurs, repeat #5 .	th hot flowing water (approx. 140 E).	NOTE: once cleaning process begins, parts must not be touched with bare hands. Use rubber gloves for met parts, cotton oloves therafter	10. Wrap parts individually in Kraft paper.	1 1	Mask outer edge of frame members (-17,-19,-21,4-22)	dipplied . 0001 to .0003 film thickness. Allow to air dry 30 minutes and		16 hours should				

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	JOB ORDER NO.	OPLRA	R OPERATIONS INSTRUCTION	Clean Core (-15) by immersing in MEK and allowing to drain dry. Mrap pieces individually in Kraft paper. Handle with cotton gloves.	5 Verify above.	O Clean bonding fixture with Kimwipe saturated with MEK. When dry apply spray-on mold release.	9 Remove both film adhesives from freezer. Allow to reach room temperature before moralling Apply film adhesive (Deliabord 303-1) to -13	skin and trim off excess. Assemble -13 skin. n adhesive #370-B into strips approx. 578" wi	frame members (-17,	(-15) Apply film adhesive (393	ed side), trim off excess and place o Prepare test couponand place alongside	fixture. Place top place on bonding fixture, secure with boilts and tighten uniformly. NOTE: Ribbon direction of -15 as shown in drawing		NOIE: Until fixture is closed, white cotton gloves must be used.	5 Verify above.				THE RELEASE OF THE PROPERTY OF				
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STEERED AT HOLDSHELLINKS CORPORATION • FAILLY INDUSTRIES CARROW DOUBLE CARD ASSENBLY	AWA TIOON NOTICE OF		00F RATION	OPERALIONS INSTRUCTION	Attach thermocouple leads and place loaded fixture in oven to cure at 250 T - 260 F.	Monitor temperature and notify assembly personnel when 60 minutes at 250 F has elapsed. Provide strip recorder readout and attach to this P.R.C.	Verify above.	Remove from oven, allow to air cool. Disassemble fixture and remove bonded assy. Hold test coupon for Q.C. Disposition.	Destructively test coupon for peel strength as required.	FINAL ACCEPTANCE: 1. Verify all operation completed. 2. Verify test coupon as required. 3. Verify parts conform to drawing requirements. [See note page 1 of this P.R.C.)	Hold for next assy.			
STER		JOB ORDER NO.		DEPT UPER	P.A. 80	18A 90	9.C. 95	P.A. 100	Q.C. 105		P.C. 110			

APPENDIX D

MPES SEAT STRUCTURE ACCEPTANCE TESTS

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STRUCTURAL TESTS

INTRODUCTION

The text in this appendix documents the dynamic testing conducted on the MPES seat structure. Four seats were procured from Stencel Aero Engineering Corporation under NADC Contract No. N62269-80-C-0203. Criteria for acceptance of these seats included static application of a 12,600 lb. load on the seat lid and an 8,000 lb. drogue chute bridle pull force on the upper seat back panel. However, in the absence of a feasible cost-effective method of applying the static load, it was decided to base acceptance on dynamic evaluation using the NADC ejection tower facility.

One of the four procured seats was subjected to the dynamic evaluation tests. These tests included two ejection tower tests of approximately 25 G and a drop test which imposed a 5,100 lb. pull force on the seat back panel. These tests reflected the maximum capability of the test facility, and although they did not impose the loads specified in the seat acceptance criteria, they were still severe enough to expose any gross weakness in the structural integrity of the seat structure.

SUMMARY OF RESULTS

The tested seat (S/N0001) successfully withstood all dynamic structural tests as established by NADC engineering personnel. There was no evidence of any structural failure or approach to failure on any portion of the seat structure.

CONCLUSION

The seats provide enough structural integrity for use on all dynamic testing of the MPES system which has been currently planned.

EJECTION TOWER TESTS

The test seat (S/N 0001) was modified by the addition of an inertia reel, lap belt retraction/release mechanisms for lower torso restraint, headrest, seat cushion, back cushion, and the addition of 55.5 lbs. of lead ballast. The ballast duplicated the anticipated weights of heavy seat components which impose stresses on the seat structure during high acceleration. The seat was mounted to an adapter plate such that total ejection force was directed into the catapult attachment fittings closely replicating actual ejection conditions. A 95 percentile dummy weighing 250 lbs. was installed in the seat and the system installed on the ejection tower (See Figure D-1). Instrumentation was provided to measure catapult pressure, seat acceleration parallel to rails, and dummy chest accelerations G_{χ} and G_{χ} . Strain gages were also placed in selected locations on the seat bucket side panels as shown in Figure D-1. The results of the ejection tower tests are given in Table D-I. The maximum strain was measured on the uppermost gage shown in Figure D-I. Strain on the uppermost and middle gages was due to tensile stress. The bottom gage was subjected to compressive stresses. A maximum strain of 3.882 micro-inches/inch was achieved on Test No. 3. This strain corresponds to a tensile stress of 41,149 psi



Figure D-1- Ejection Tower Test Configuration

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which is approximately 60% of the yield strength of the local material (Al-7075-T6).

Table D-I Ejection Tower Test Results

Ejection Test No.	Seat Wt. (lbs.)	Dummy Wt. (1bs.)	Seat Acceleration (G's)	Max Measured Strain	Calculated Stress (psi)	% Yield Stress
1	125	231	16.5	2.057	21,840	33%
2	125	231	24.3	3.616	38,300	58%
3	125	231	25.0	3.882	41,149	62%

Test Date: 13 June 1980

DROGUE CHUTE BRIDLE PULL FORCE TEST

This condition was established to duplicate the load imposed by the drogue parachute opening shock transmitted through the drogue bridle release mechanism into the seat structure back panel. The same seat/dummy configuration as used in the ejection tower tests was used for this test. Redundant restraints were added for restraining the upper and lower torso to insure that the dummy load would still be transmitted into the seat structure and that the dummy and instrumentation in the dummy would not be destroyed if the primary restraint failed. The seat/dummy combination was dropped from varying heights into straps which terminated in a single fitting retained by a shackle release pin. Figures D-2 and D-3 show the test configuration. A series of three drop tests was conducted with the maximum riser/seat reaction force of 5,104 lbs. being attained. The results of these tests are presented in Table D-II.

Table D-II Dynamic Pull Force Test Results

Drop Test No.	Seat/Dummy Drop Weight (1bs.)	liax. Total Seat Deceleration (G's)	Max. Total Dummy Deceleration (G's)	Riser/Seat Reaction Force (lbs.)
1	370	11.40	12.0	2506
2	370	16.85	22.1	4713
3	370	21.92		5104

Test Date: 7 August 1980

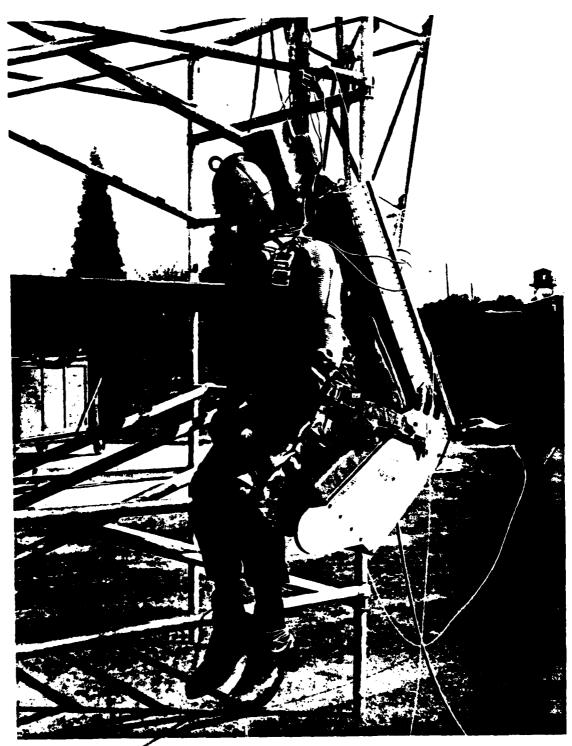


Figure D-2- Pull Force Test Configuration

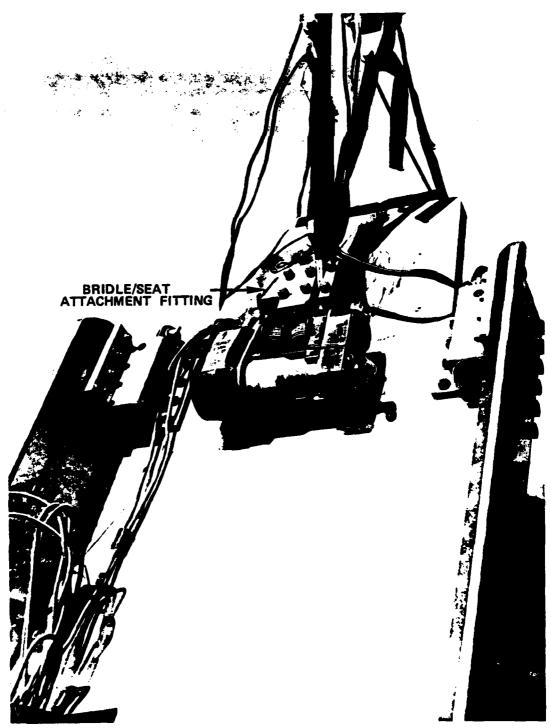


Figure D-3- Bridle/Seat Attachment Fitting Location for Pull Force Test

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